A. R. E. A. CONVENTION NUMBER

MARCH 14, 1942

Railway Age

The "Rail Way"
is still
The "Best Way"

The Rail Joint Company, Inc.
50 Church St. New York, N. Y.

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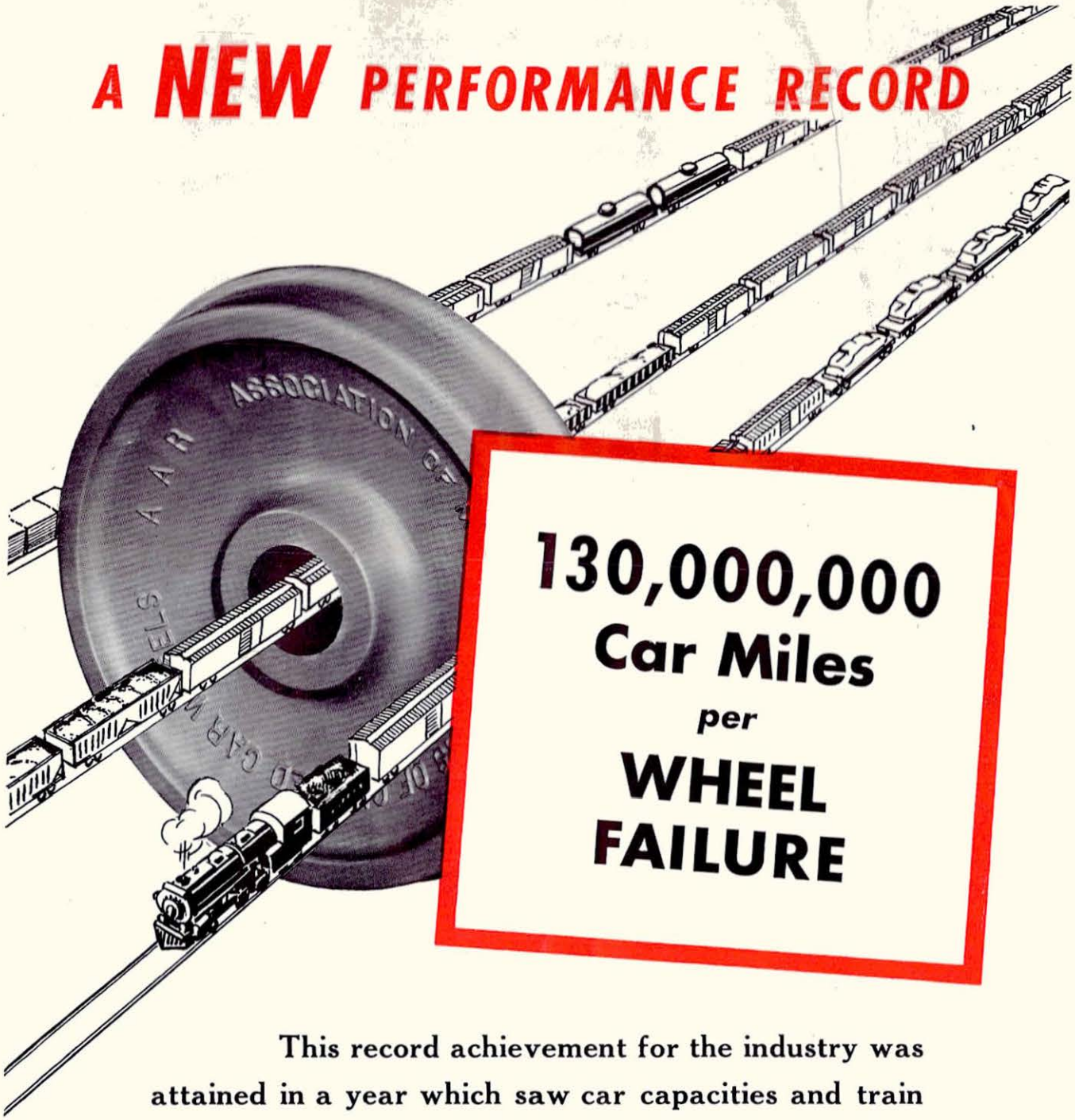
A NEW PERFORMANCE RECORD



130,000,000 Car Miles per WHEEL FAILURE

This record achievement for the industry was attained in a year which saw car capacities and train speeds increased to the highest levels ever attained.

It is final proof of the progress already made towards our ultimate goal—"to make every wheel as good as the best."

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

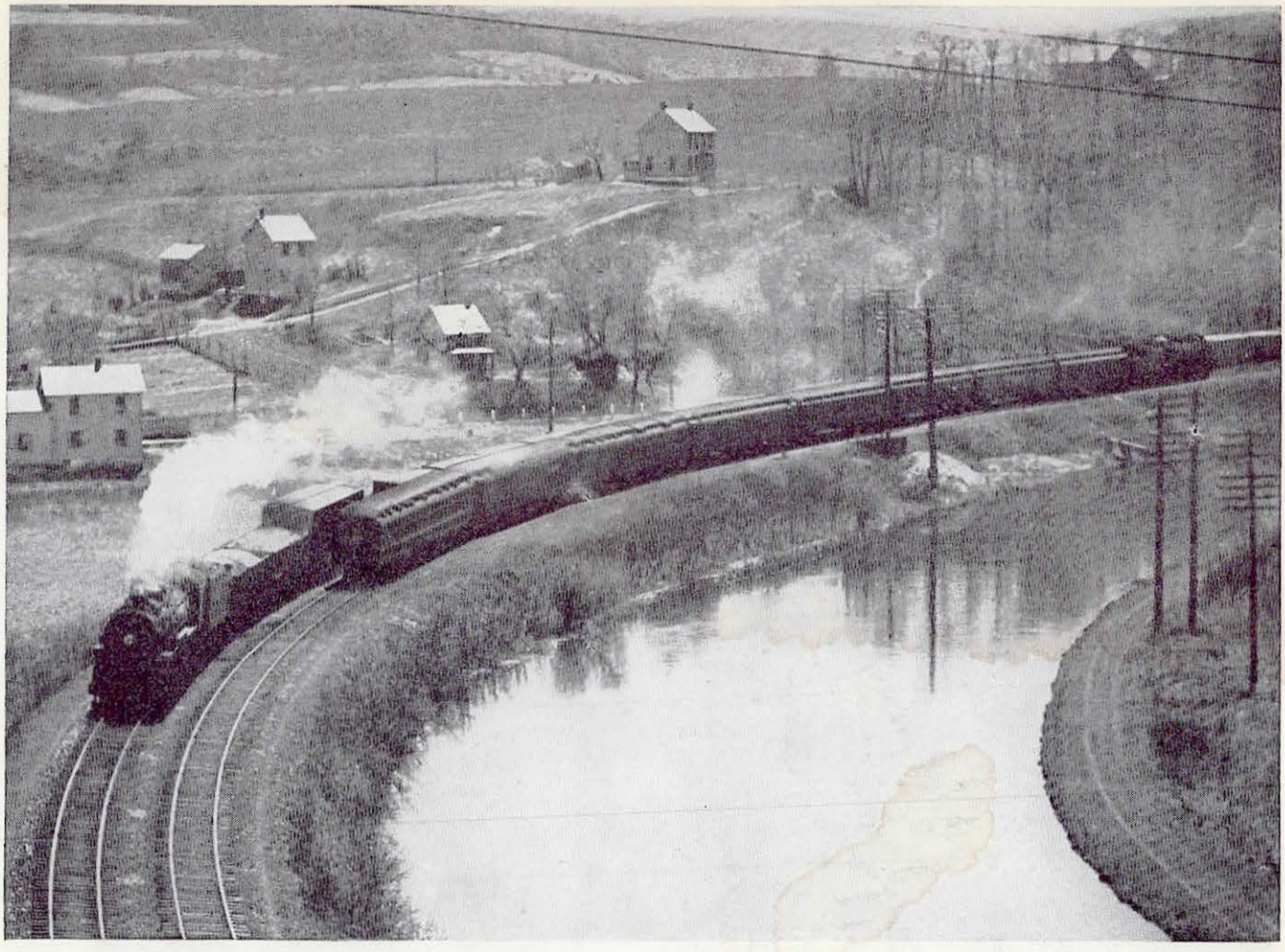
230 PARK AVENUE,
NEW YORK, N. Y.

445 N. SACRAMENTO BLVD.,
CHICAGO, ILL.

AMCCW

ORGANIZED TO ACHIEVE:
Uniform Specifications
Uniform Inspection
Uniform Product

Published weekly by Simmons-Boardman Publishing Corporation, 1309 Noble Street, Philadelphia, Pa. Entered as second class matter, January 4, 1933, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription price $6.00 for one year U. S. and Canada. Single copies, 25 cents each. Vol. 112, No. 11.



BETHLEHEM TRACK EQUIPMENT...

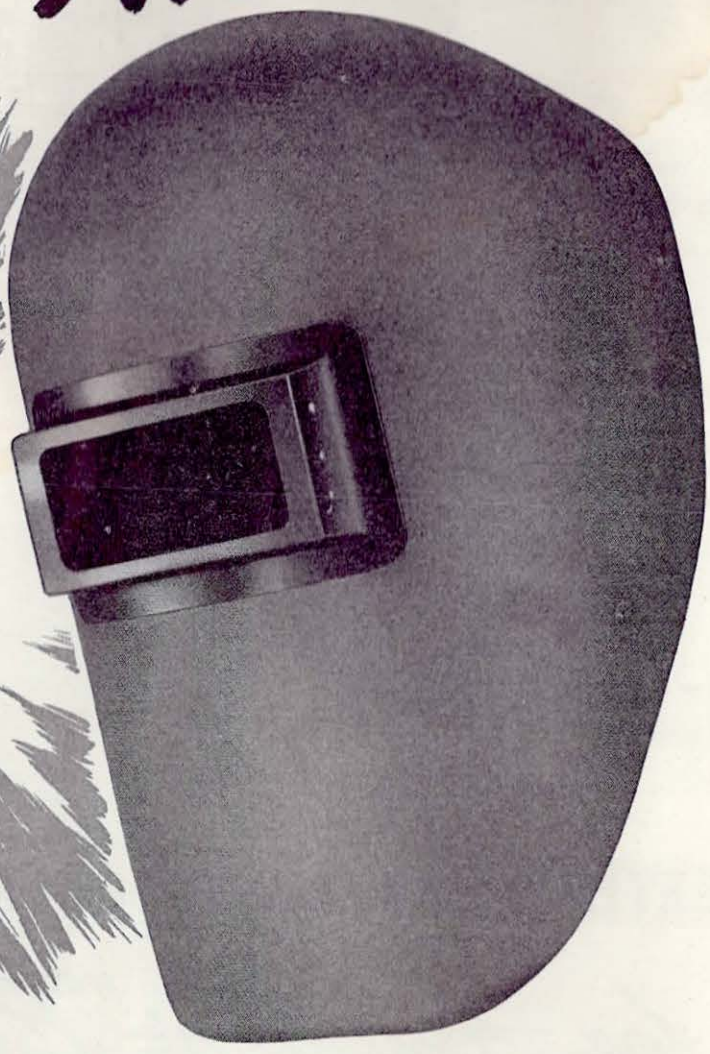
for America's "Burma Roads"

In today's emergency, the bulk of all materials and machines for all-out production is being carried by America's railroads. For the smooth, continuous flow of this immense traffic, these prime movers of America's freight depend on more than 250,000 miles of main-line track—a quarter of a million miles of steel. To maintain these highways of steel through continued supply of vital track equipment for repair and replacement is another of the steel industry's big war-time jobs. Bethlehem Track Equipment—on the job and in reserve—is doing its part today on many a strategic line.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

New... and Available



AO Filterweld Welding Plates

No longer do you have to wait for AO welding plates... in *any* quantity. For AO is now filling all orders for Filterweld, the newest development of the American Optical Company Research Laboratories.

Filterweld — now available in the Noviweld shades #9, #11, and #13, as well as in shades #8, #10, #14 — is a service-proved welding glass that is identical with Noviweld in ultra-violet and infra-red absorption. It is scientifically controlled in production... has fixed standards of densities... conforms with U. S. Bureau of Standards specifications.

Order Filterweld Plates for your AO Helmets today. Just get in touch with your nearest American Optical Company branch office.

American Optical Company

SOUTHBRIDGE, MASSACHUSETTS

America TAKES ITS HAT OFF TO THE RAILROADS

Six hundred thousand troops were moved by the railroads of the U. S. in the 16 days before Christmas (an extra above regular business)—a feat probably unparalleled in the history of this nation or any other.

. . . AND AMERICA CONFIDENTLY EXPECTS EVEN GREATER ACHIEVEMENTS

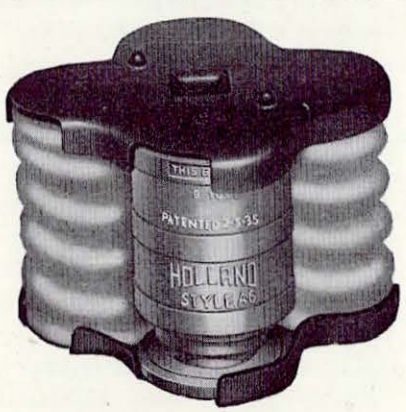
Records such as this are made possible by the extra efforts of a loyal Personnel, and the continual improvements in railroad operating methods and equipment, including such devices as those shown below.

HOLLAND VOLUTE SNUBBER SPRINGS

PREVENT BROKEN BOLSTER SPRINGS CAUSING DANGER AND DELAY

Under today's heavier loads and higher speeds, there is increased danger of springs being driven solid and broken unless suitable snubbing action is provided. Holland Friction Volute Snubber Springs are ideal for this purpose because they have characteristics similar to viscous type snubbers used on automobiles—a snubbing action geared to all conditions from light loads up to full loads.

Why not use these improved snubber springs on your trucks subject to severe service?

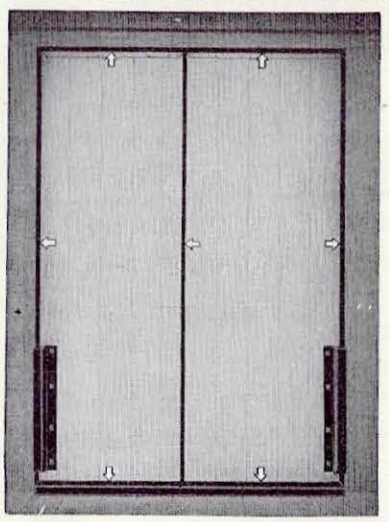


Improved Style A-6 Holland Volute Snubber Spring as applied in spring nest.

WRITE FOR FURTHER DETAILS

CAP-KO DOUBLE SEAL

GASKETS FOR REFRIGERATOR CAR DOORS



Speed Shipments
AND CUT CLAIMS

These Holland Closures do a double job of speeding up perishable freight:—first, by cutting time required to open and close doors, and second by making ice go farther, and preventing spoilage.

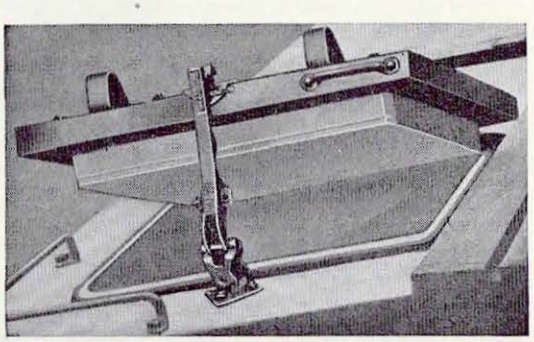
Holland Closures are applicable to present equipment. The Closures are made against flat surfaces and compensate for variation in door dimensions. As they are soft and yielding on both sides, a double seal is procured. They operate easily, regardless of swelling, shrinking or warping of the opening.

← CAP-KO DOOR CLOSURE

Arrows point to the gaskets which provide a continuous, flat sealing surface, all the way around the openings.

CAP-KO HATCH CLOSURE

Eliminates separate plugs; does away with delays and damage that result when plugs get stuck.



Write for Blue Print Data and Further Information on Holland Door and Hatch Closures.

HOLLAND COMPANY

332 SOUTH MICHIGAN AVENUE, CHICAGO, ILLINOIS

✓ Check these

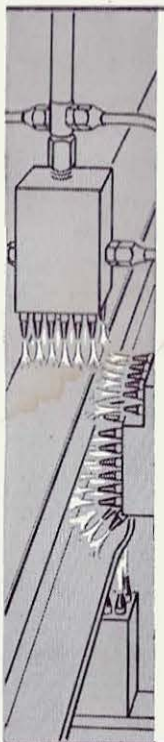
They Can Conserve Materials—Forestall Problems of Replacement Parts—and Are Important to Speedy and Safe Transportation of Essential Supplies

THE railroads have for many years carried on programs of reclamation and repair as a necessary part of economical operation. Today's requirements have greatly intensified the need for such work. Accepted standards of what should be reclaimed must be broadened. Because full utilization of existing parts and materials is essential, *any* usable parts and materials should be reclaimed.

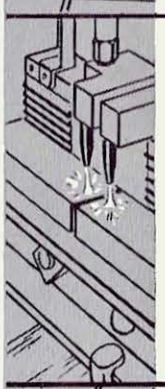
The methods and service that the Oxweld organization provides are entirely directed toward helping the railroads to do this. In addition to Oxweld procedures for economical *reclamation and repair,* effective Oxweld methods have been developed to *retard* wear or corrosion, and thus to forestall problems of replacement parts and materials.

It is suggested that the Oxweld methods shown here be reviewed and all those that can be advantageously applied checked off for use in way and structures programs for 1942.

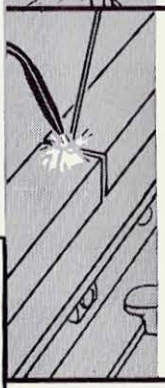
THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York



Butt-Welding of Rails—when rails are joined by means of oxy-acetylene butt-welding, batter and joint maintenance are completely eliminated and a smooth-riding rail surface that reduces vibration, noise, and impact is provided. For these reasons, oxy-acetylene butt-welding is particularly advantageous in tunnels, on bridges, in station platforms, and on overhead structures. *When butt-welding is done by means of the mechanized pressure-welding equipment that Oxweld makes available, the weld produced has superior strength and physical characteristics without any added essential materials being required in its making.*



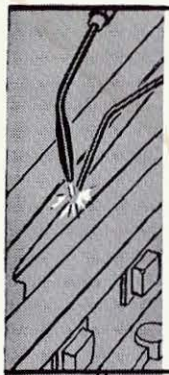
End-Hardening of Rail—all available new rail must be made to last as long as possible. Oxy-acetylene end-hardening with Oxweld equipment prolongs rail life because it imparts a hard, batter-resistant end to new rail. *The work is done in track without interruption to traffic.*



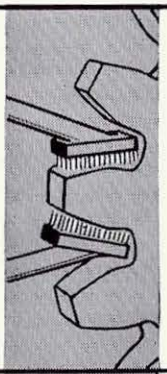
Rebuilding of Rail Ends — use of this Oxweld method saves rail replacements now when steel mill output is so greatly needed for other vital uses. The improved Oxweld MW welding rod produces a deposit that is *more batter-resistant than the original rail metal.*

SINCE 1912—THE COMPLETE

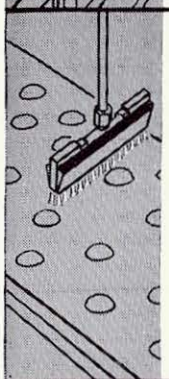
OXWELD METHODS . .



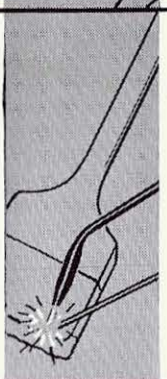
Repair of Worn Trackwork — worn switch points, crossings, points and wing rails of frogs, and other worn trackwork which today is difficult to replace *can usually be restored to a good-as-new condition by means of oxy-acetylene welding so that its useful life is prolonged.*



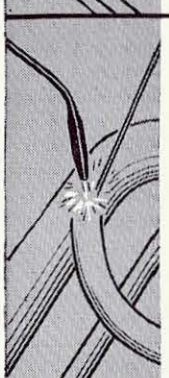
Flame-Hardening — this is a recommended method for giving the wearing surfaces of metal parts additional hardness which makes them last longer. *It is applied advantageously to such work equipment parts as gears, sheaves, crane wheels, and tractor treads.*



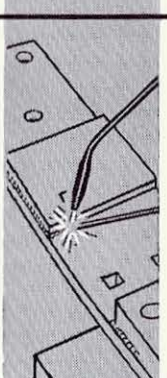
Flame-Cleaning — loose paint, scale, rust, and surface moisture can be quickly removed from structural steel by means of oxy-acetylene flame-cleaning. *When this is done just before painting, the paint goes on the warm, dry, steel faster, bonds tighter, and lasts longer.*



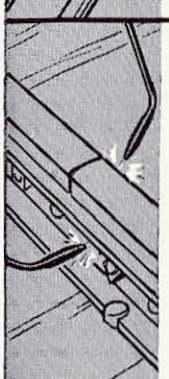
Hard-Facing — parts subjected to severe abrasion, heat, or corrosion can be made to last many times longer when wearing surfaces are hard-faced with Haynes Stellite alloy. *Typical parts suitable for hard-facing are tamper bars, shovels, grader blades, and bucket teeth.*



Welded Piping — welded piping systems for all types of service remain leakproof and maintenance-free for the life of the pipe — because the welds are as strong and ductile as the pipe itself. *In addition, many fittings and layout drawings can be completely eliminated.*



Repair of Retarder Parts — car retarders and many other items of classification yard equipment can be repaired by oxy-acetylene welding. *Included among these parts are shoe beams, crank arms, operating bars, girders, spring rods, skates, and retarder framework.*



Restoring Worn Joint Bars—when worn joint bars are left in track, they contribute to track deterioration. Worn bars can be economically reclaimed to restore a made-to-order fishing surface by *oxy-acetylene flame-straightening in track, or by means of oxy-acetylene welding.*

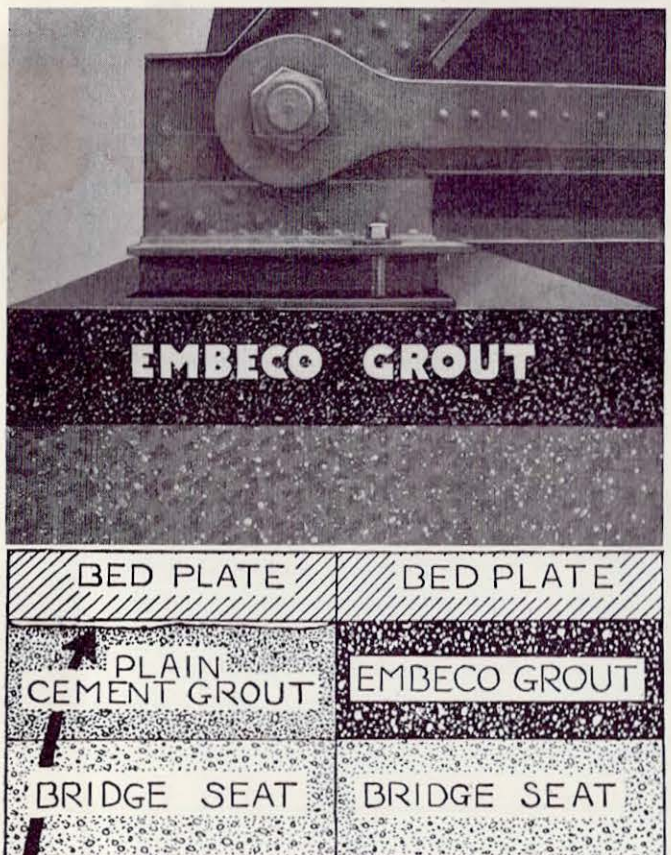
Reprints of these pages are available for distribution to members of your organization to help plan full utilization of Oxweld services. If you would like to have copies, write for them, specifying the number you require. They will be sent to you without obligation.

OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

The word "Oxweld" is a registered trade-mark of a Unit of Union Carbide and Carbon Corporation

Non-Shrink EMBECO

FOR BRIDGE SEAT GROUTING and CONCRETE REPAIRS



POOR CONTACT due to mortar shrinkage, permits increased vibration and rapid disintegration. Embeco produces a lasting bearing surface.

WHAT IS NON-SHRINK EMBECO?

Non-shrink Embeco is a specially prepared metallic aggregate, which when mixed with sand, cement and water makes lasting grouts and concrete repairs. Many railroads carry non-shrink Embeco in their warehouses as a stock item because of its many advantages in all grouting work. It is equally successful in making concrete repairs.

HOW DOES NON-SHRINK EMBECO WORK?

The expansion qualities of non-shrink Embeco when used as a grout insure a perfect contact with bedplate, prevent vibration and exclude oil and water. These same qualities create a permanent bond between new and old concrete when non-shrink Embeco is used in repairing disintegrated concrete. Because of the long life of grouts and concrete repairs made with non-shrink Embeco, there is a substantial saving in labor costs. Faster completion of work causes fewer delays in traffic schedules.

GET THE FACTS ON THESE
WRITE FOR LITERATURE ON "EMBECO"

MASTERBUILT PRODUCTS

THE MASTER
CLEVELAND, OHIO

Pozzolith CEMENT DISPERSION

FOR MORE DURABLE CONCRETE with SPEED and SAVINGS

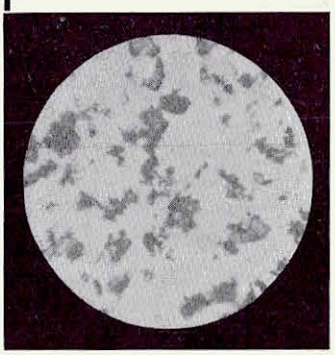
WHAT IS CEMENT DISPERSION?

It has long been recognized by concrete technicians that cement under usual construction conditions does not yield its full cementitious value. Cement Dispersion, with Pozzolith, was developed by Master Builders research staff to overcome this problem. Proof of the success of Cement Dispersion may be found in all types of projects from coast-to-coast.

HOW DOES CEMENT DISPERSION WORK?

The *dispersion* principle, basically important in such products as steel, rubber, plastics, paints, graphite and many others, has been successfully applied to cement. The two photomicrographs at right illustrate the effect of the *dispersion* principle on cement. By putting more of the cement to work, Cement Dispersion greatly increases its efficiency. This assures *speed* and makes savings available whether the concrete requirements are strength, workability, placeability, water-tightness or durability . . . a fact of outstanding importance in *all* concrete construction.

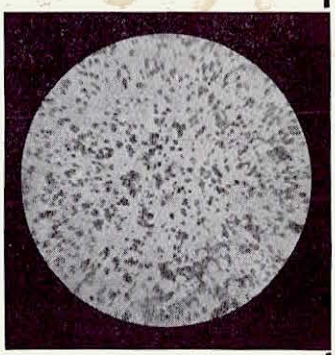
Only a part of the cementitious value of the cement, whether normal portland or high early, is utilized under usual construction conditions. Investigation shows that with 28 days curing only 50% hydrates. [Anderegg and Hubbell, A. S. T. M. 29 II 554 (1929)].



Cement suspended in water
UNDISPERSED

WITHOUT POZZOLITH

In a normal concrete mix, cement particles tend to bunch together, thereby (1) limiting hydration and (2) trapping water within the cement clumps. (See photomicrograph above).



Cement suspended in water
DISPERSED

WITH POZZOLITH

Cement Dispersion drives these particles apart and (1) exposes their entire surface area to hydration, at the same time (2) making the water entrapped in the clumps available for lubrication of the mix. (See photomicrograph above).

OUTSTANDING PRODUCTS . . . . .
WRITE FOR LITERATURE ON "POZZOLITH"

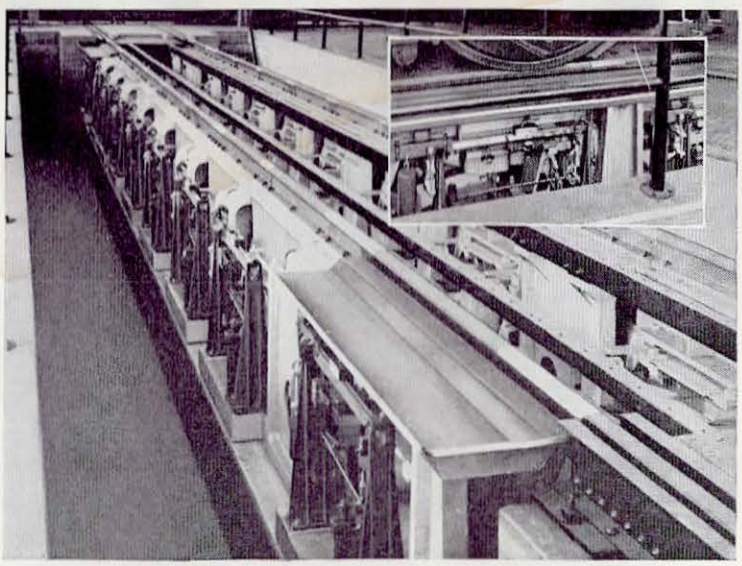
BUILDERS CO.

TORONTO, ONTARIO

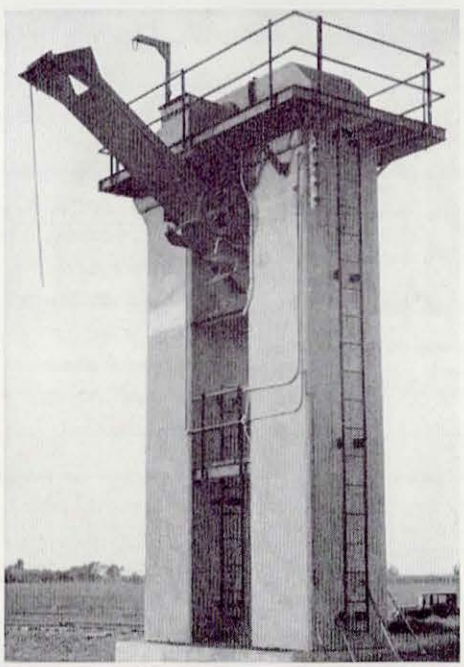
MASTERBUILT PRODUCTS

READY for the

FAIRBANKS-MORSE LOCOMOTIVE WATER CRANES

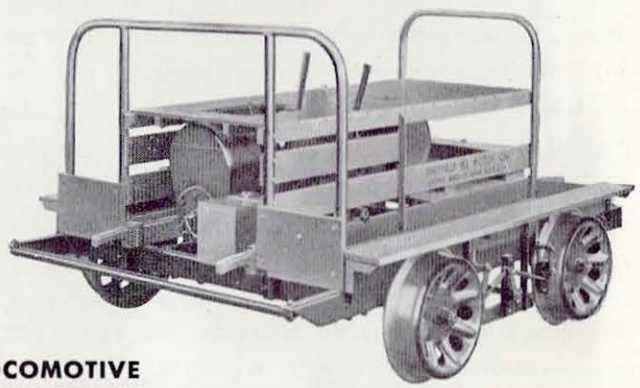


FAIRBANKS SCALES from 1-lb. to 1,000,000-lb. capacity



F-M LOCOMOTIVE COALING STATIONS & DIRECT COALERS

More than 40 in service in all climates. Elevating capacity 90 tons per hour. 8" pitch steel roller chain with ultimate strength 14 tons. Minimum maintenance and operating cost. Operated from tender or platform.



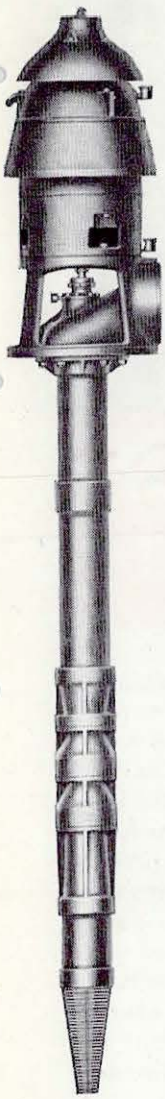
F-M SHEFFIELD MOTOR CARS

and wheels, axles, bearings, and accessories for motor cars, trailers, handcars, and push cars.

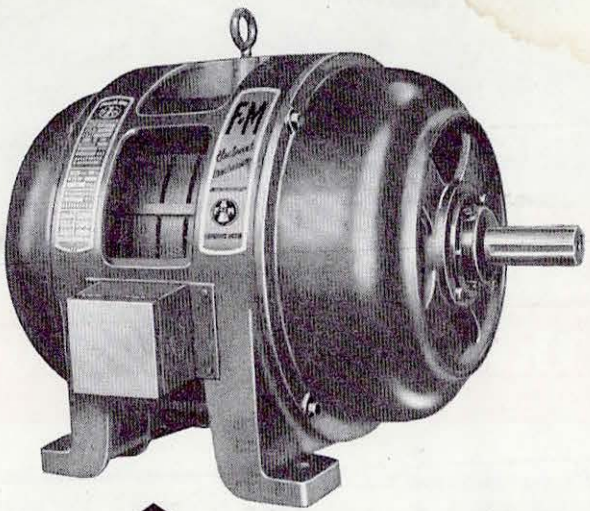
FAIRBANKS, MORSE & CO.

600 SOUTH MICHIGAN AVENUE, CHICAGO, ILLINOIS

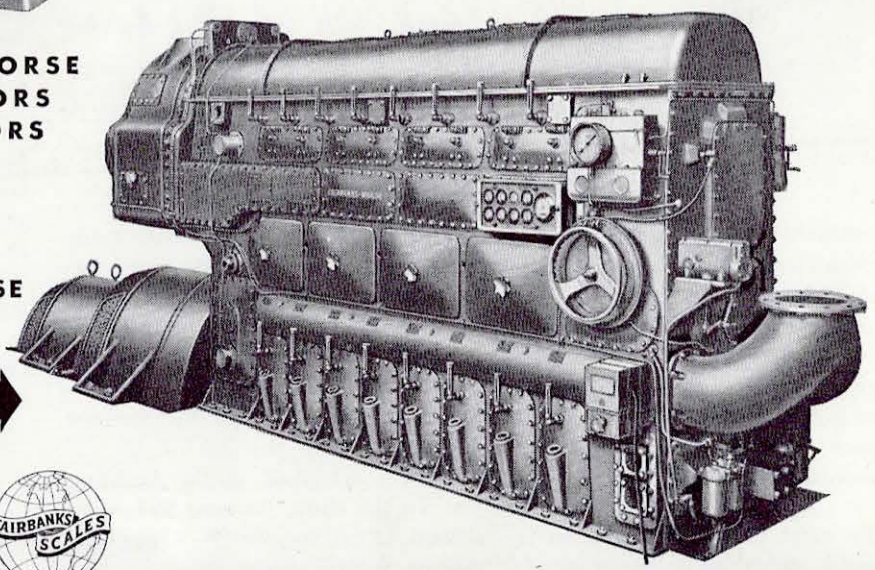
Emergency...



FAIRBANKS-MORSE PUMPS
All sizes, in steam, power, trash, angleflow, centrifugal, rotary, turbine, and propeller types.



FAIRBANKS-MORSE ELECTRIC MOTORS AND GENERATORS



FAIRBANKS-MORSE DIESEL ENGINES
5 hp. to 2000 hp.

THE railroads of the United States are ready to meet their country's greatly increased wartime needs. Ready to transport vast tonnages of raw materials and finished products. Ready to speed great troop movements while maintaining all other essential services. And Fairbanks, Morse & Co., supplier of behind-the-scenes railroad equipment for more than 100 years, is proud to be serving railroads with an even broader and finer line than ever before . . . anxious to do everything possible toward helping railroads prepare for the even heavier responsibilities to come.

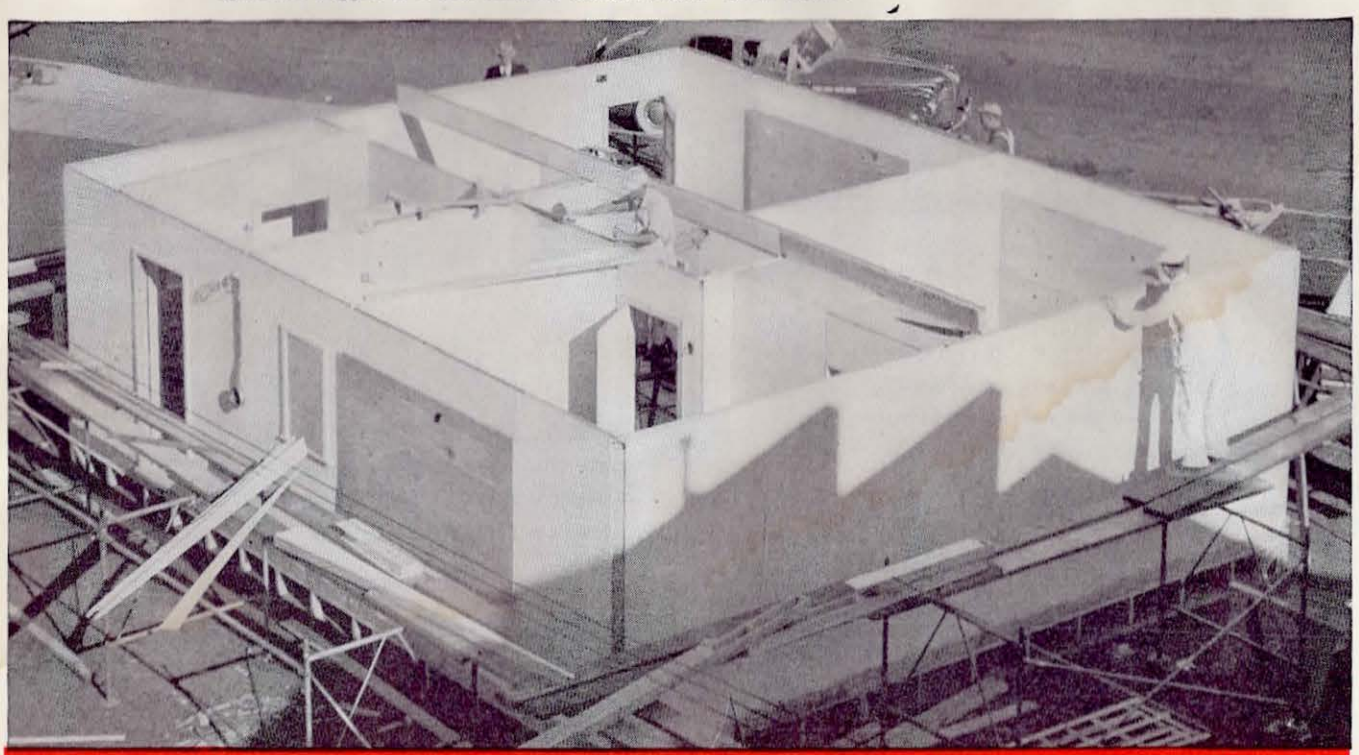
FAIRBANKS SCALES

RAILROAD SALES OFFICES: **NEW YORK • CHICAGO • ST. LOUIS • ST. PAUL CINCINNATI • ATLANTA • NEW ORLEANS • SAN FRANCISCO**

Export Division: **80 Broad Street, New York City**

Canada: **Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Winnipeg**

This photograph shows the assembly of a prefabricated home produced by Plywood Structures, Inc., Los Angeles, a firm which has prefabricated hundreds of defense housing units in southern California. Prefabricated buildings can easily be made demountable. That is, when their present use is over, they can be taken apart and shipped to a new location, thus preventing "ghost towns".



BUILD NEEDED STRUCTURES *FASTER* by Prefabricating them with Plywood!

This new book describes Prefabrication with Plywood in detail, tells what the leading prefabricators are doing and how this practical, time-saving building method can serve you. Send for your free copy today!

The establishing of new army camps, war industries and other defense projects in the areas you serve is probably requiring you to increase your construction program. You may need storage structures, dormitories or residences and similar buildings . . . *all of which can be built faster if you prefabricate them with plywood!*

For the most part, prefabrication is shop work which can be systematized. Power equipment and production-line assembly greatly speed construction of wall sections or other easily handled units. This greater speed cuts down overhead. Greater accuracy and control are obtained. Superior construction practices, such as gluing, are made possible. Foundations built during the prefabrication of wall sections are ready to use the instant the sections are delivered to the building site. In the shop, no time is lost on account of bad weather; working conditions remain good. The erection of sections on foundation is so rapid that weather is a negligible factor.

The free book, *"How to Build Houses Fast,"* gives you a clear picture of prefabrication and tells how it can serve you. It explains why Douglas Fir Plywood, the prefabricators' favorite material, is used as the basic structural material in over 1000 prefabricated buildings every month. Write for your free copy . . . study it . . . and then see how prefabrication and versatile Douglas Fir Plywood can help your railway build superior structures in less time. Send your request to Douglas Fir Plywood Assn., Tacoma Building, Tacoma, Washington.

GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D.F.P.A. INSPECTED

GENUINE PLYWALL Douglas Fir Plywood WALLBOARD D.F.P.A. INSPECTED

SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

PLYPANEL D.F.P.A.

EXT.-D.F.P.A.

GENUINE PLYWOOD SHEATHING D.F.P.A. INSPECTED

DOUGLAS FIR PLYWOOD Real Lumber MADE LARGER, LIGHTER SPLIT-PROOF STRONGER

RACOR Switch Point Lock

SAFE—COMPACT—EXTRA HEAVY

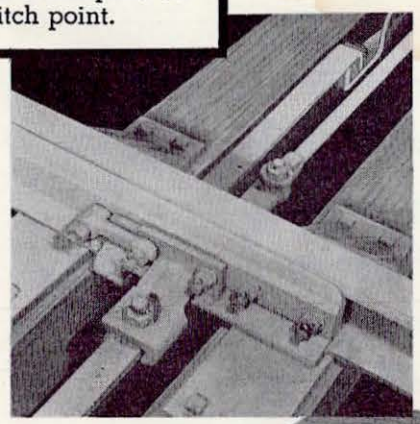
Located below the top of the tie, the mechanism of the new Racor Switch Lock is entirely separate from the stand and completely protected. Even if the stand is knocked down, the lock will still function.

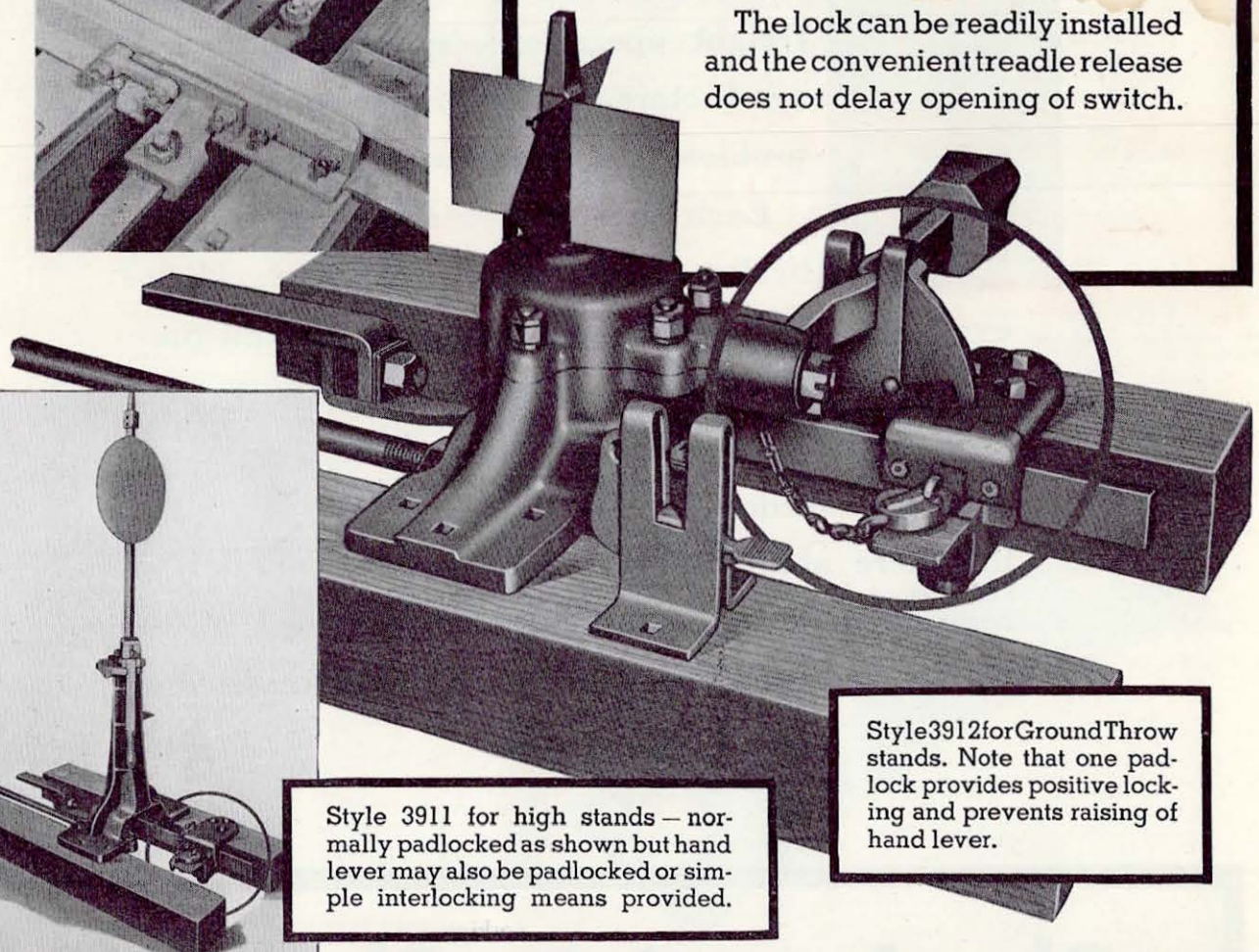
Furthermore, the locking rod clamps directly to the switch point and the padlock cannot be inserted unless the switch is properly closed. Simple adjustment permits accurate setting.

These features, together with the extra-heavy construction, provide complete protection for the switch against failure or even destruction of any part of the switch stand or its connections.

The lock can be readily installed and the convenient treadle release does not delay opening of switch.

Point attachment showing locking rod clamped to switch point.





Style 3911 for high stands — normally padlocked as shown but hand lever may also be padlocked or simple interlocking means provided.

Style 3912 for Ground Throw stands. Note that one padlock provides positive locking and prevents raising of hand lever.

RACOR **RAMAPO AJAX DIVISION**

THE AMERICAN BRAKE SHOE & FOUNDRY CO. • 230 Park Ave., New York

MODERNIZING STATION INTERIORS?

DURABLE, ATTRACTIVE J-M MATERIALS MEET EVERY REQUIREMENT

Any outmoded station interior can be easily and economically transformed into a "new" station with Johns-Manville Building Materials.

Specially developed for wall, floor and ceiling use, they are furnished with pre-decorated, pre-finished surfaces. No painting or other finishing is necessary. The cost is surprisingly low. And because all these J-M Materials are durable and easy to clean, little maintenance is required.

Brief facts on some of these modern materials are given below. For full details, and for helpful suggestions on modernizing stations, write Johns-Manville at New York, Cleveland, Chicago, St. Louis or San Francisco.

J-M Materials for Station Modernization

1. J-M Insulating Board is an ideal low-cost decorative material for ceilings. Can be applied right over old surfaces. New-type J-M "Lightning Joint" conceals nail-heads.

2. J-M Asphalt Tile Flooring is comfortable underfoot; attractive and durable; easy to clean. Wide range of sizes and colors permits practically unlimited decorative effects.

3. J-M Asbestos Flexboard in attractive colors; made of asbestos and cement, it is fireproof, rot-proof; will not chip, crack or craze. May be used for both walls and ceilings.

. . . and for exteriors

J-M Asbestos Roofing and Siding Shingles are attractive, fireproof, as permanent as stone. Can't rot, never need preservative treatment.

J-M Rock Wool Insulation keeps buildings cooler in summer, saves fuel in winter.

JOHNS-MANVILLE

84 YEARS OF SERVICE TO TRANSPORTATION

RACOR Switch Point Lock

SAFE—COMPACT—EXTRA HEAVY

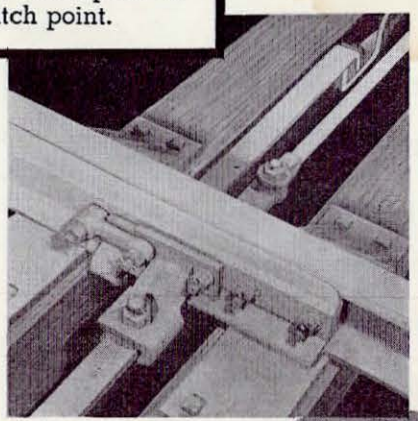
Located below the top of the tie, the mechanism of the new Racor Switch Lock is entirely separate from the stand and completely protected. Even if the stand is knocked down, the lock will still function.

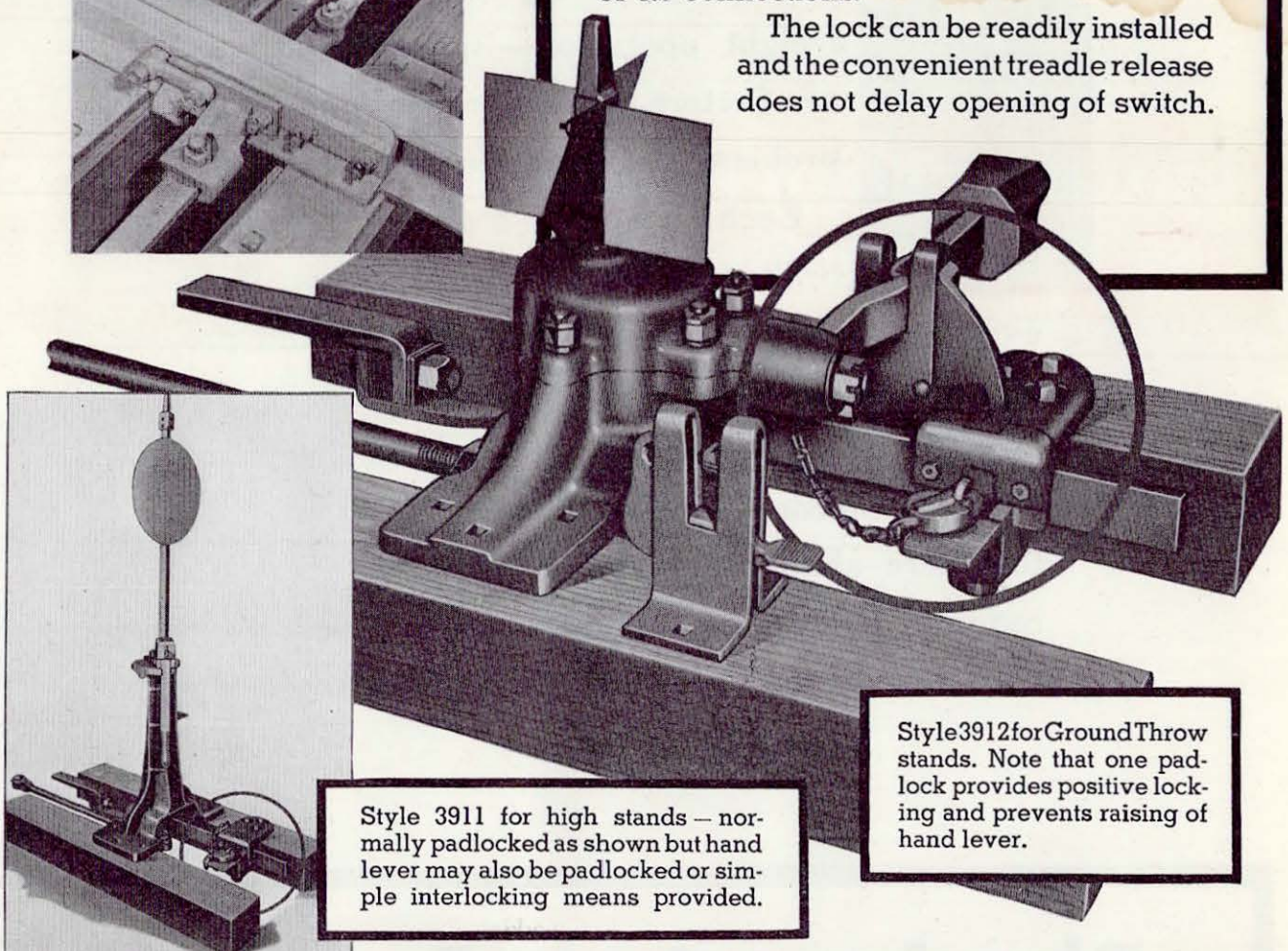
Furthermore, the locking rod clamps directly to the switch point and the padlock cannot be inserted unless the switch is properly closed. Simple adjustment permits accurate setting.

These features, together with the extra-heavy construction, provide complete protection for the switch against failure or even destruction of any part of the switch stand or its connections.

The lock can be readily installed and the convenient treadle release does not delay opening of switch.

Point attachment showing locking rod clamped to switch point.





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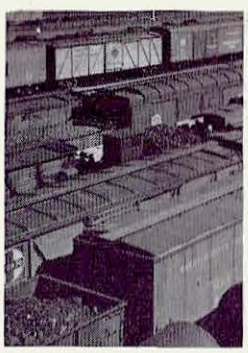
RACOR

RAMAPO AJAX DIVISION

THE AMERICAN BRAKE SHOE & FOUNDRY CO. • 230 Park Ave., New York

MORE MILES PER TON



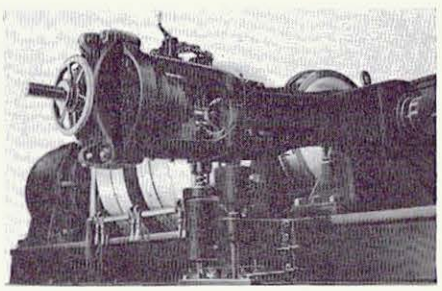
Operating conditions on American railroads are constantly setting new standards for freight operation — speeds and loads are factors that enter into some of the problems that frequently arise.

Each year the service required of brake shoes grows more severe. However, stop distances must be maintained and premature failure of brake shoes avoided.

Supplying the kind of brake shoes that are needed calls for more than the mere ability to make castings. It requires up-to-date foundry practices and controls plus a highly specialized knowledge

The American Brake Shoe

of braking and its problems—knowledge that has come to us only through long experience backed by our unsurpassed research laboratory resources.



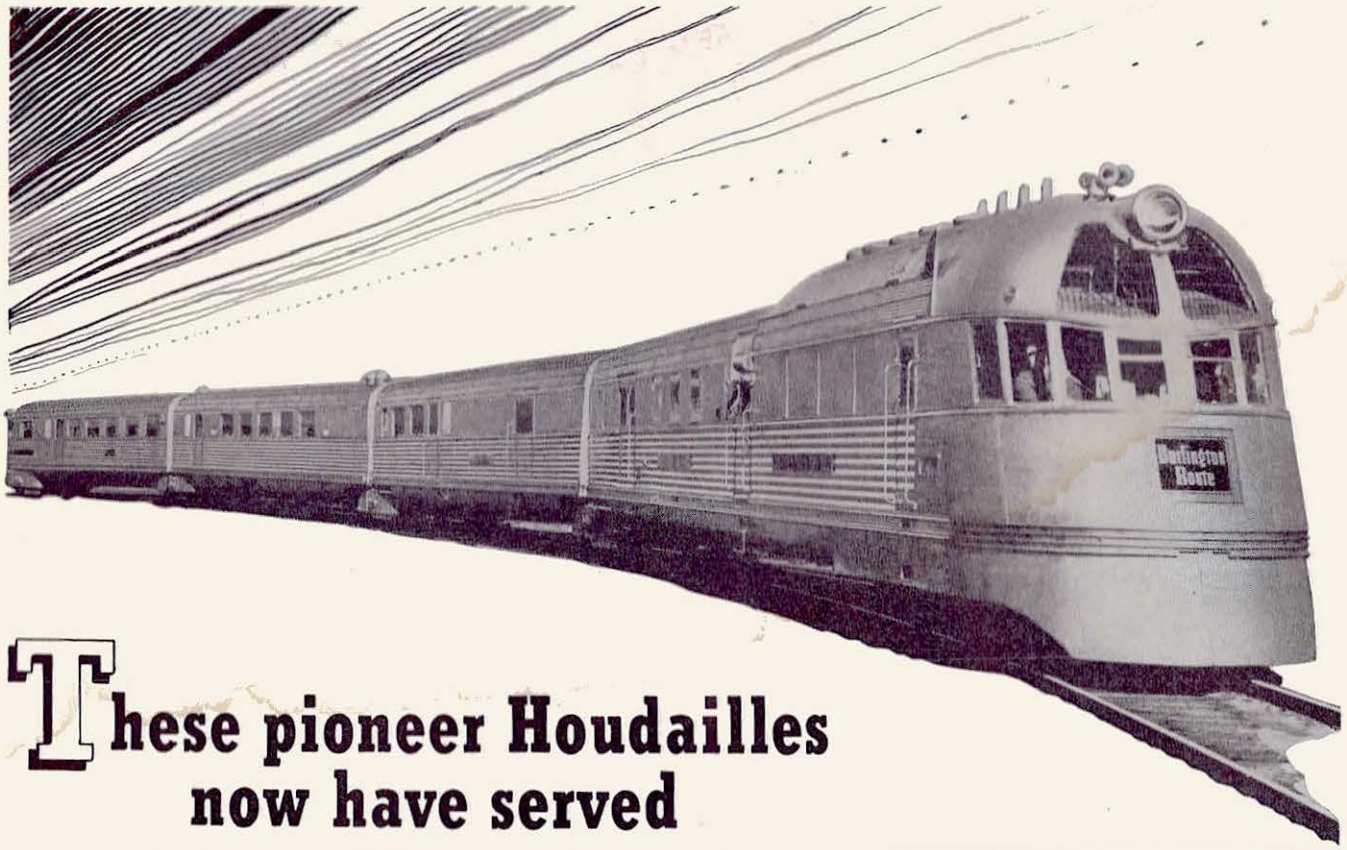
By anticipating needs, knowing what to do and how to do it, and having unequalled equipment for research and production, we have developed a series of improvements which have more than kept pace with the demands.

The record of Duplane reinforced brake shoes for freight service clearly shows that they can be counted on to give better service—and more of it—than ordinary brake shoes.

Duplane Steel Back Reinforcement

and Foundry Company

BRAKE SHOE AND CASTINGS DIVISION

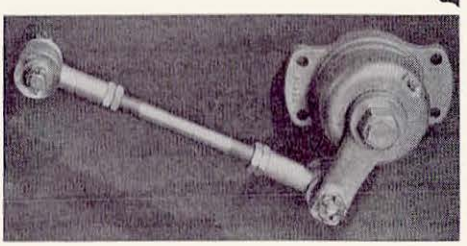


These pioneer Houdailles now have served 1,283,130 MILES

More than seven years have elapsed since Houdaille engineers developed the first hydraulic equipment to insure smooth and stable riding qualities on the world's first lightweight, high-speed train.

This first train, Burlington's Budd-built Pioneer Zephyr, made its epochal maiden trip on November 11, 1934. On December 31, 1941, it had completed 1,283,130 miles—and now daily continues its round trip between Lincoln and McCook.

Today Houdaille equipment stabilizes and cushions most of the country's high-speed trains. Our extensive engineering experience in the railroad field is at your service.



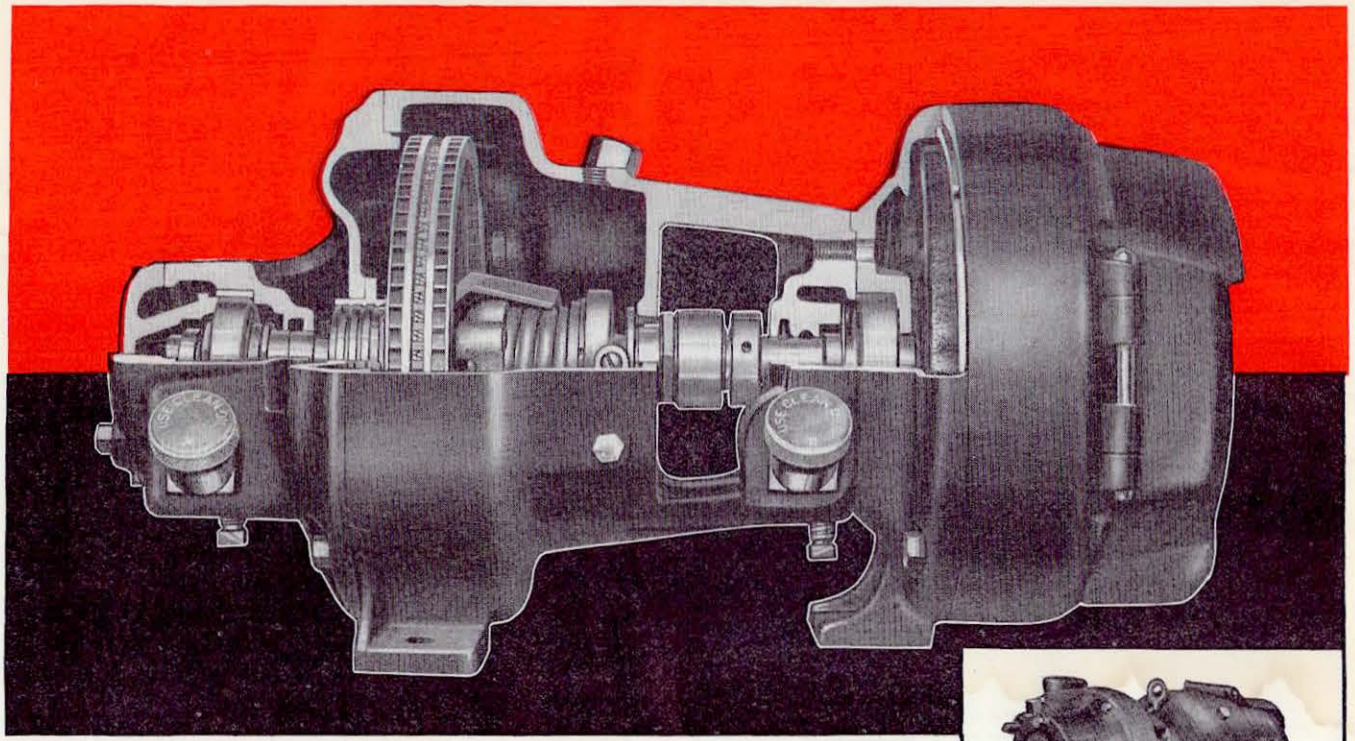
Atchison, Topeka, and Santa Fe—Chicago, Rock Island, and Pacific—Chicago, Burlington, and Quincy—Boston and Maine—Atlantic Coast Line—Florida East Coast Railway—Reading Company—Seaboard Air Line—The Pennsylvania Railroad—Gulf, Mobile, and Ohio—Southern Railway System—The Alton Railroad—New York, Susquehanna & Western—The New York Central Railroad—The Chicago, Milwaukee, St. Paul, and Pacific Railroad — Illinois Central Railroad — The Denver and Rio Grande Western Railroad—Missouri Pacific Railroad—The New York, New Haven, and Hartford Railroad—Chicago, North Shore, and Milwaukee Railroad

Also The Pullman Company who operate Houdaille equipped cars in other lines than those indicated above.

HOUDAILLE HYDRAULIC CONTROL

HOUDE ENGINEERING DIVISION OF HOUDAILLE-HERSHEY CORPORATION

BUFFALO, N. Y.



IMPROVED

Locomotive Lighting Performance

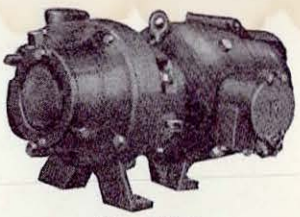
Installation of the improved Type K-240 headlighting turbo-generator gives you the immediate advantages of more uniform electrical performance and the greater reliability so important under present-day operating conditions. This improved performance is accompanied by direct savings in operating costs, for this equipment runs longer between inspections, requires less maintenance, and uses less oil. Your existing Type K-2 equipments can be readily converted to the modern Type K-240 by application of the improved interchangeable parts.

TYPE K-240 FEATURES:

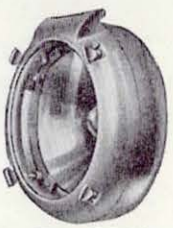
Improved armature design—40-bar commutator · Alloy valve and valve cage · Alloy turbine blading · Accurate, sensitive governor · Drop-forged turbine wheel · Rigid, heavy shaft · Large oil cellars · Controlled oil circulation · No oil leakage.

Pyle-National turbo-generators are available in a full range of types, 500 watt to 12,000 watt capacities, for all classes of service.

Pyle-National headlight cases, cab lighting fixtures, and wiring equipment allow you to choose from a complete line adapted to any type of modern motive power.

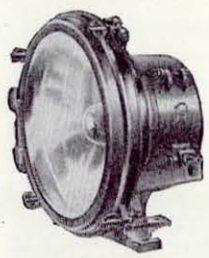


Type MO-6
Turbo-generator



Type C-14605
Streamline Case

Type C-155
Cast Headlight Case



Type 14055
Switch Engine Case

THE PYLE-NATIONAL COMPANY
1334-58 North Kostner Avenue • Chicago, Illinois

Offices: New York • Baltimore • Pittsburgh • St. Louis
St. Paul • San Francisco

Export Department: International Railway Supply Co., New York
Canadian Agents: The Holden Co., Ltd., Montreal

PYLE-NATIONAL
RAILWAY ELECTRICAL EQUIPMENT
• SINCE 1897 •

HEADLIGHTS • TURBO-GENERATORS • CONDUIT FITTINGS • MULTI-VENT

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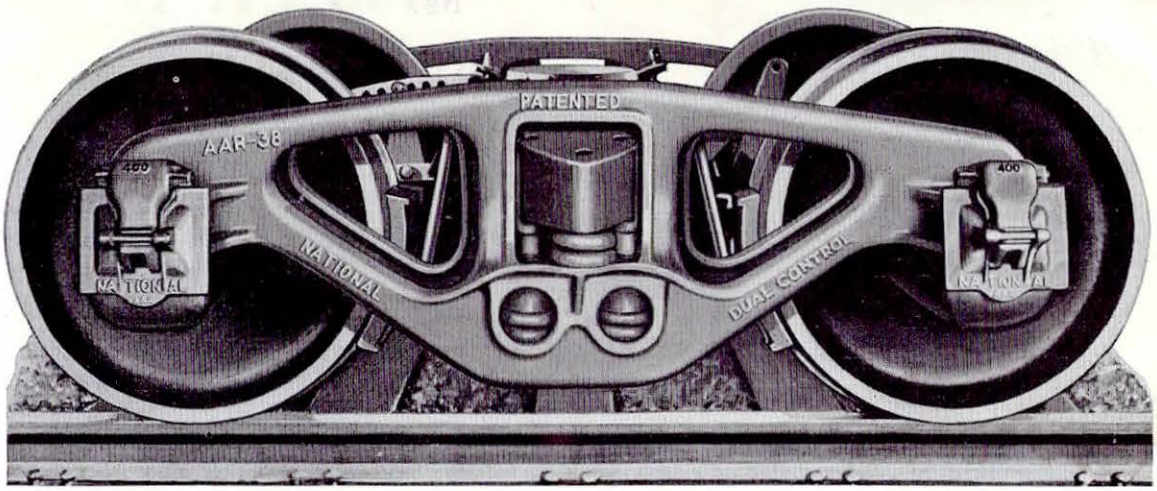
J-M Rock Wool Insulation keeps buildings cooler in summer, saves fuel in winter.

JOHNS-MANVILLE

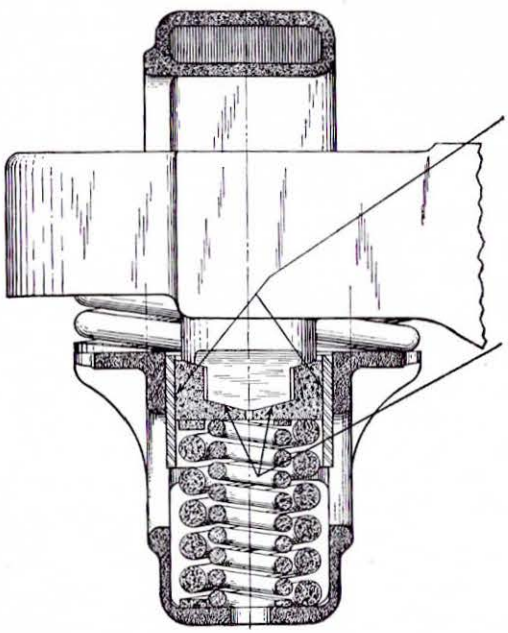
84 YEARS OF SERVICE TO TRANSPORTATION

NATIONAL B-1 TRUCKS
with DUAL CONTROL



National B-1 Trucks with Dual Control
assure safety and smooth riding in high speed service.

Built-in features that control both the vertical and horizontal oscillations assure superior riding qualities and greater safety.



Section Thru Control Unit

2 Units in Each Side Frame

CONTROL No. 1

Vertical oscillation or spring bounce is friction controlled by pressure of wedges against a steel bushing, during spring action. This protects the lading.

CONTROL No. 2

Horizontal oscillation is controlled by opposing angles of incline on the friction wedges, which center the bolster trunnions and resist forces which tend to throw the truck out of square. This is necessary for safety in high speed service.

Complies with all A. A. R. Specification Requirements

NATIONAL MALLEABLE AND STEEL CASTINGS CO.

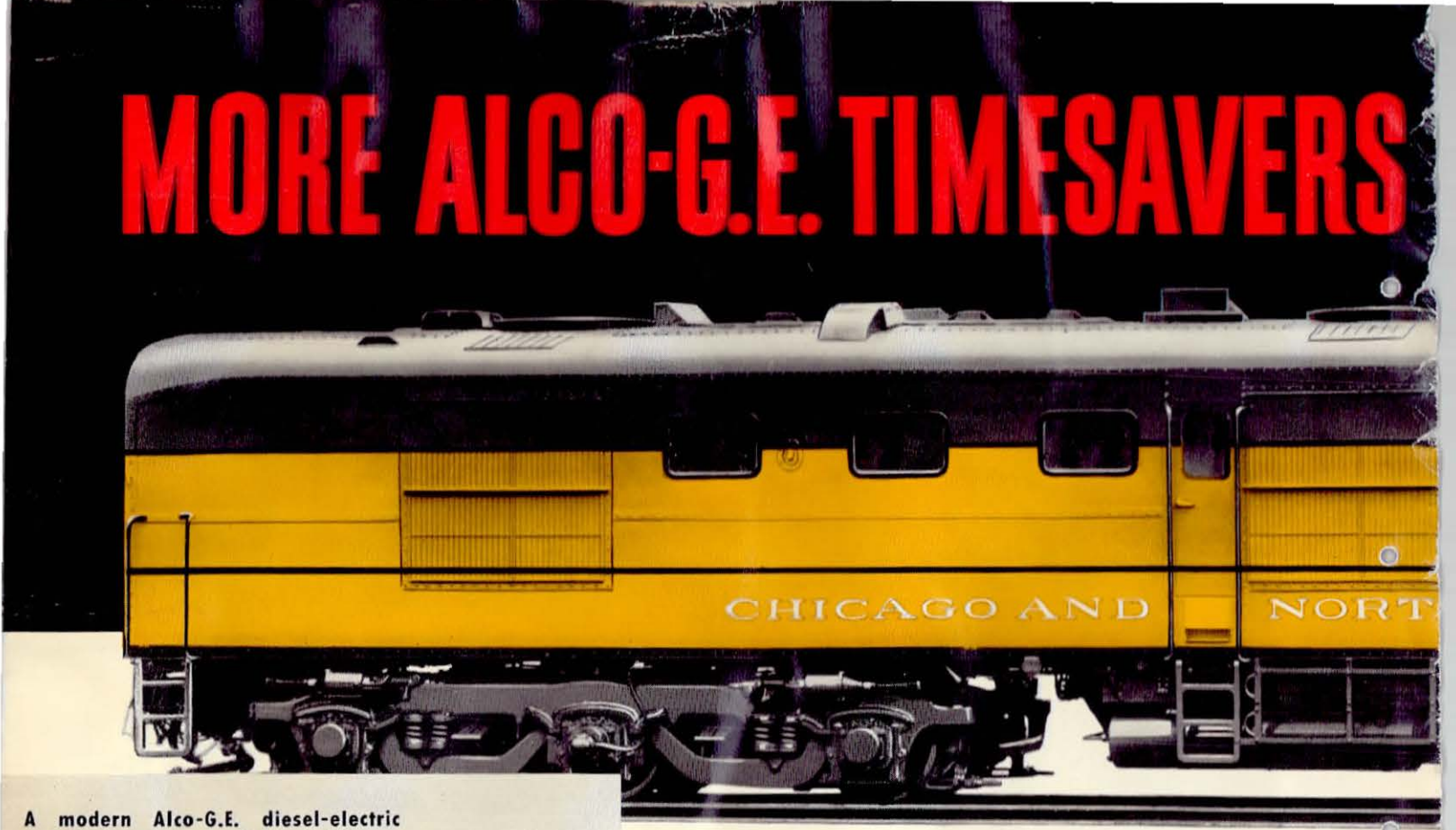
General Offices: CLEVELAND, OHIO

Sales Offices: New York, Philadelphia, Chicago, St. Louis, San Francisco

Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.

Canadian Representatives: Railway and Power Engineering Corporation, Ltd., Toronto and Montreal

MORE ALCO-G.E. TIMESAVERS



A modern Alco-G.E. diesel-electric switcher in service on the North Western

in 1926 Its first diesel-electrics cut switching costs 35%

In 1926, five months after the first diesel-electric to serve the West was delivered by us to the North Western, this report on its operation appeared in the *Wall Street Journal:*

"An oil-electric locomotive in use on the Chicago and North Western Railway system for more than five months has shown a saving of practically 35 per cent in operating and maintenance expense over steam locomotives doing the same work."

Two more Alco-G.E. switchers went into North Western service that same year—the forerunners of hundreds of Alco-G.E. diesel-electrics which have consistently proved their ability to get more work done faster and better.

FOR FAST, LOW-COST SWITCHING, SWITCH TO THE ALCO-G.E. LINE

1000-hp combination road-switcher

1000-hp switcher

660-hp switcher

FOR THE North Western

in 1942 — when every second counts — 14 Alco-G.E. units will reenforce the North Western's war-time service

Of the 14 Alco-G.E. diesel-electrics recently ordered by the North Western, a 2000-hp road locomotive and four 660-hp switchers are already on the job. Nine 1000-hp switchers are still to come.

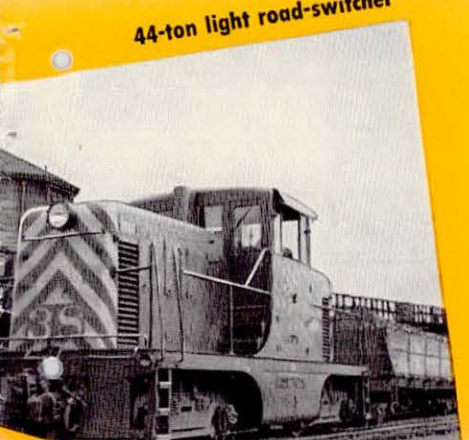
The streamlined road unit, now hauling one of the famous "400's," went into service August 19, 1941, between Chicago and Green Bay, Wisconsin, and had made 258 runs between these cities by January 1.

The switching units, in daily yard service, are proving that modern Alco-G.E. locomotives, with 17 years of diesel-electric experience behind them, have everything it takes to keep working round the clock.

Repeat orders like the North Western's are one sure indication of ability. Your Alco or G-E representative has complete facts on the reasons why more than 100 roads have purchased Alco-G.E. diesel-electrics, and endorsed their quality with 125 repeat orders. Plan to see him soon. And be sure to ask about our 1000-hp road-switcher and our 44-ton light road-switcher. Both can do an all-purpose job for you—switching, accumulating trains, and hauling these trains on the road.

Today, when every second counts, you'll find Alco-G.E. quality and versatility more important than ever.

44-ton light road-switcher



Alco DIESEL-ELECTRIC

GE

AMERICAN LOCOMOTIVE and GENERAL ELECTRIC

114-21-9040

Offices on Wheels!

All over America, at maximum safe speeds, our railroads carry executives, production men, engineers, and military experts to key points in the nation. These men can't waste a working minute . . . and often the ideas they develop originate on the train itself. Work cannot be stopped.

By providing the current for bright lighting and comfortable air-conditioning, Exide-Ironclad Batteries help make efficient work possible in railway coaches everywhere. Exide-Ironclads give unfailing dependability at low cost. In more ways than one . . . Exide helps *Keep America Rolling.*

Exide
IRONCLAD
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

SIMPLEX SNUBBERS SATISFY SHIPPERS

Freight cars equipped with Simplex Snubbers satisfy shippers because they reduce injury to lading.

Simplex Snubbers control spring action at present-day speeds and under varying loads. They minimize jolts and jars that are the source of damage to lading.

The Simplex Snubber is inserted as a unit in place of one member of a standard coil spring group.

SIMPLEX THE LONG-LIVED SNUBBER

REDUCES DAMAGE CLAIMS

AMERICAN STEEL FOUNDRIES

All Hair INSULATION STILL GOOD after 27 years!

These photographs are from Special Bulletin No. 308 which describes the refrigerator car experiment. Copies available on request from Michigan State College, Agricultural Experiment Station, East Lansing, Michigan.

HERE'S outstanding proof that ALL HAIR insulation *never stops working!* Two retired refrigerator cars, *built and insulated with hair-felt in 1915* . . . are still doing a perfect job as farm cold-storage units. Although no longer suitable for railroad use, their hair-felt insulation still offers complete protection for fresh-picked fruit. You'll find the full story in Special Bulletin No. 308 issued by the Agricultural Experiment Station of Michigan State College, describing experiments conducted on the farm of Carl Schweikert, in Allegan County, Michigan.

HAIRINSUL NEVER LOSES ITS EFFICIENCY . . . KEEPS ICING COSTS LOW FOR YEARS!

When you insulate refrigerator cars with HAIRINSUL you make a permanent investment—it never loses its protective properties, may be used again when the cars go out of service. HAIRINSUL is a thick, flexible ALL-HAIR insulating blanket with the low thermal conductivity of only .27 BTU's. It can be flanged, curved or fitted to any framing irregularities. It resists fire, is unaffected by moisture, doesn't pack down, doesn't deteriorate. We'll gladly send you complete engineering data and samples of its various weights and thicknesses.

AMERICAN HAIR & FELT COMPANY
MERCHANDISE MART • CHICAGO

HAIRINSUL

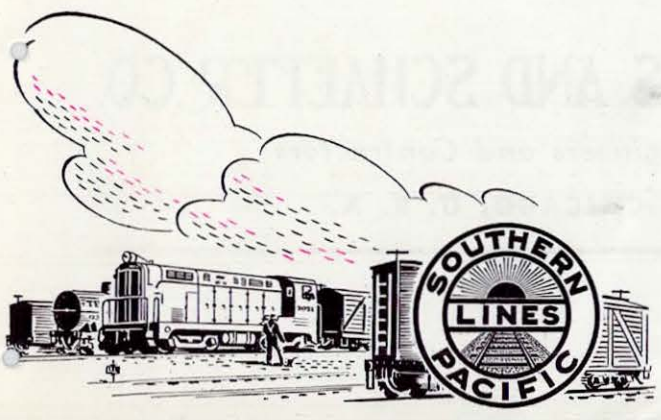
★ ALL HAIR INSULATION FOR REFRIGERATOR CARS ★

12 BALDWIN *Diesel-Electrics* ON SOUTHERN PACIFIC LINES

FIVE 1,000-hp Baldwin Diesel-electrics, recently delivered to Southern Pacific Lines, are taking their place alongside five 1,000-hp and two 660-hp locomotives delivered early in 1941.

Rugged in construction—engineered for dependability and easy maintenance—a high degree of visibility—low fuel cost—availability that insures a high return on the investment—that is the story of Baldwin Diesel-electrics.

Both the 1,000-hp and 660-hp locomotives are powered with Baldwin De La Vergne 4-cycle Diesel engines and Westinghouse electrical transmission equipment.



BLW THE BALDWIN GROUP

The **BALDWIN** *Locomotive Works*

PHILADELPHIA

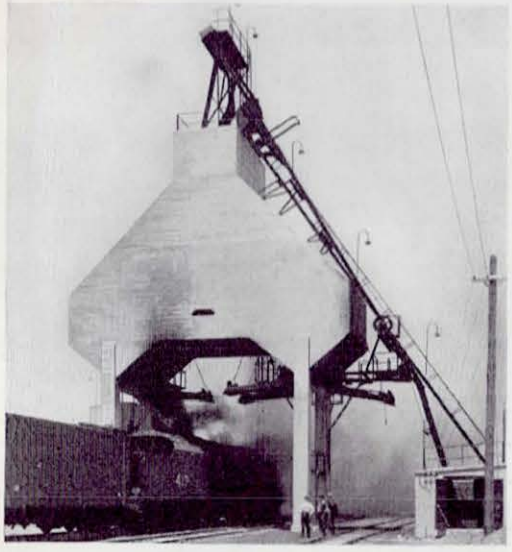
CAPACITIES ... with

Designs and Installations To Meet The Needs Of TODAY'S TRANSPORTATION!

• COALING STATIONS • SAND PLANTS
• CINDER PLANTS • ENGINE COALERS

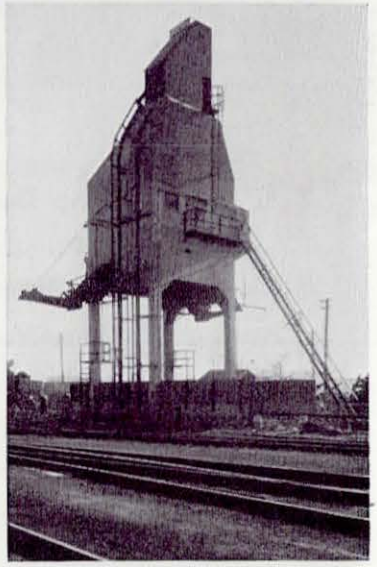
Small or Large Units, Single or Combined in "One-Stop" Plants for Coal — Sand — Cinder and Water Service . . . Skillfully Designed, Speedily Erected, Economical, Most Reliable in Service.

"ALL-AUTOMATIC" Mechanized Coaling Station Built For PENNSYLVANIA RAILROAD In 1940. Most complete ever built. Hoisting capacity 150 tons per hour (Coal & Sand). Entirely interlocked 2-Hoist Control System with Magnetic Separators. First year's output 550,000 tons coal with daily peak over 3,000 tons—stores 1250 tons coal—350 tons sand. Location—28th Street Engine Terminal, Pittsburgh, Pa.

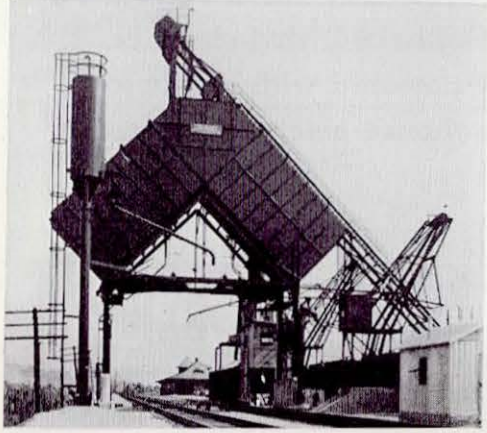


"MODERN FUNCTIONAL" Coaling Station Built For LOUISVILLE & NASHVILLE RAILROAD CO. In 1941. Mechanically counter balanced buckets—Hoisting capacity 65 tons (Coal & Sand) per hour—15 H. P. Hoist Unit hauls single bucket in emergency. Stores 300 tons coal with 75 tons capacity Sand Plant. Location—Etowah, Tenn.

"STANDARD" Coaling Station Built For THE ALTON RAILROAD In 1934. Conical design resulting in low construction—stores 100 tons. Hoisting capacity 22 tons per hour—10 HP. Hoist Unit. Location—Mexico, Missouri.



"UNIT-DESIGN" Built For ATCHISON, TOPEKA & SANTA FE RY. CO. In 1938. Stores 100 tons Coal—75 tons wet sand—15 tons dry sand with Sand Drier Room and Hoist Compartment within—Structure Hoisting capacity 40 tons per hour. Location—Pueblo, Colorado.

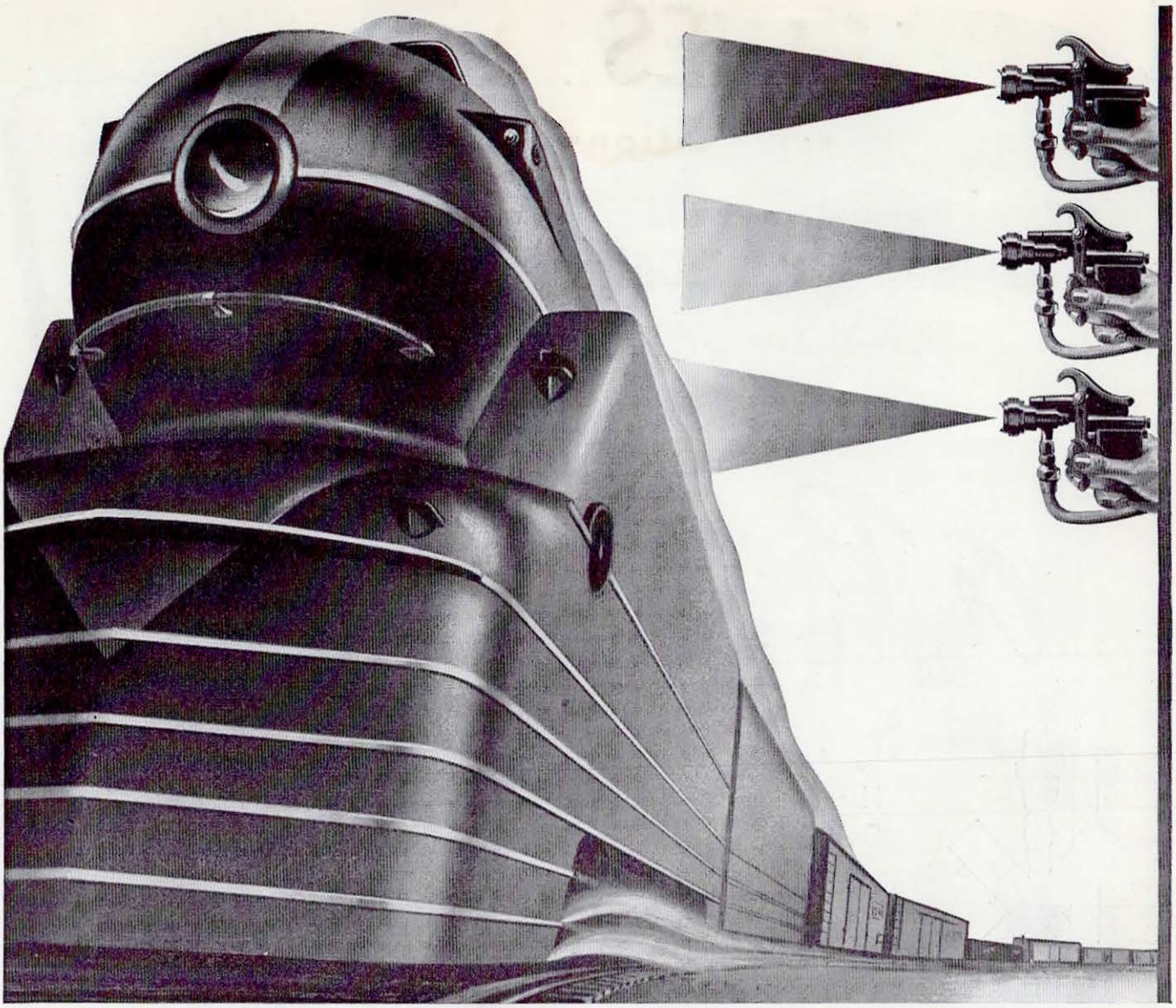


"ONE STOP" Service Plant Built For LEHIGH VALLEY RR Co. In 1940. Consists of Coaling Station, Sand Plant, Cinder Plants, Water Cranes with service ranges of 25 feet for coal—14 feet for sand—cinders and water in 2 directions arranged for 28 different types of locomotives at "One Spotting." Location—Towanda, Pa.

ROBERTS AND SCHAEFER CO.

Engineers and Contractors

CHICAGO, U. S. A.



MAIN LINE OF PROTECTION

Pittsburgh Paints Weather Many An Extra Run!

DEFENSE transportation is the *main line of America's protection, today!* So it's not only good business but a vital national service to safeguard rolling stock, terminals and other railway equipment from deterioration.

The Pittsburgh Plate Glass Company can materially help you maintain haulage capacity and reduce costs, with sturdy protective finishes developed to serve American railroads.

Carhide products are recognized widely as the scientific *system* for finishing or refinishing all wood and metal freight equipment. These paints can be applied quickly and easily. They speedily dry to a smooth-as-glass surface, saving time and money on your shop schedule. Moreover, Carhide for metal cars contains rust-inhibitive pigments which prevent and check corrosion.

For any special finishing or protective problem, a Pittsburgh Plate Glass Company technical man will be glad to consult with you at your convenience.

PITTSBURGH PLATE GLASS COMPANY
Industrial Paint Division • Pittsburgh, Pa.
Factories: Milwaukee, Wis.; Newark, N. J.; Houston, Texas; Los Angeles, Calif.; Portland, Ore.
Thresher Varnish Company Division, Dayton, Ohio

PITTSBURGH PAINTS
RAILWAY FINISHES
Smooth as Glass

Pittsburgh Plate Glass Company
Paint Division, Dept. RA-3
Pittsburgh, Pa.

Please send me your free booklet on Carhide Finishes.

*Name*_____

*Address*_____

*City*_____ *State*_____

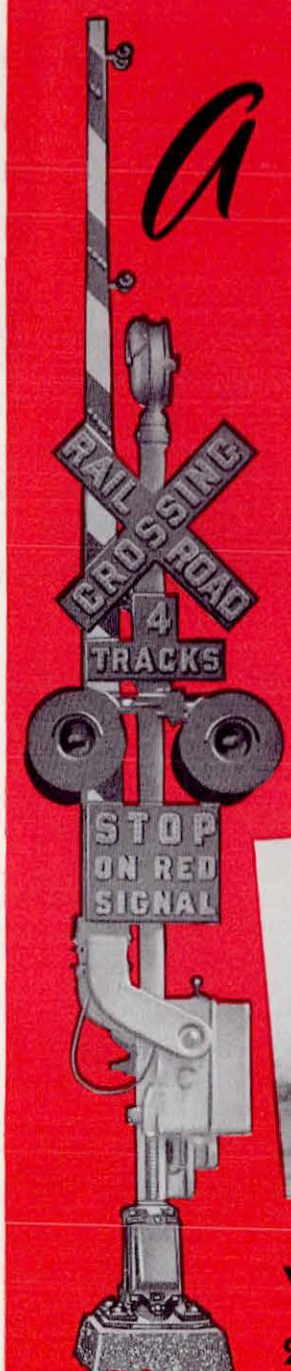
A SERIOUS PROBLEM . . .

Crossing Fatalities Highest in Ten Years

FATALITIES resulting from accidents at highway-railroad grade crossings were greater in the first eight months of 1941—January 1, to September 1—than in any corresponding period in the past 10 years, according to the Safety Section of the Association of American Railroads.

Such fatalities totaled 1,152 compared with the previous high mark of 1,198 in the first eight months of 1931. The total for the eight months period this year was an increase of 47 compared with the same period in 1940. Persons injured in highway-railroad grade crossing accidents in the eight months period this year totaled 2,849.

A Proven REMEDY



- Not Even One Auto-Train Collision Has Occurred At "Model 10" Crossings
- 1360 "Model 10" Signals Now On Continuous Duty
- Over 900 Crossing-Years of Service
- Safeguards Against Second Train

U. S. Pat. No. 2,137,196
Pat. in Canada, June 27, 1939

Model 10

NOW More Than Ever.. AUTO-TRAIN COLLISIONS MUST BE AVOIDED!

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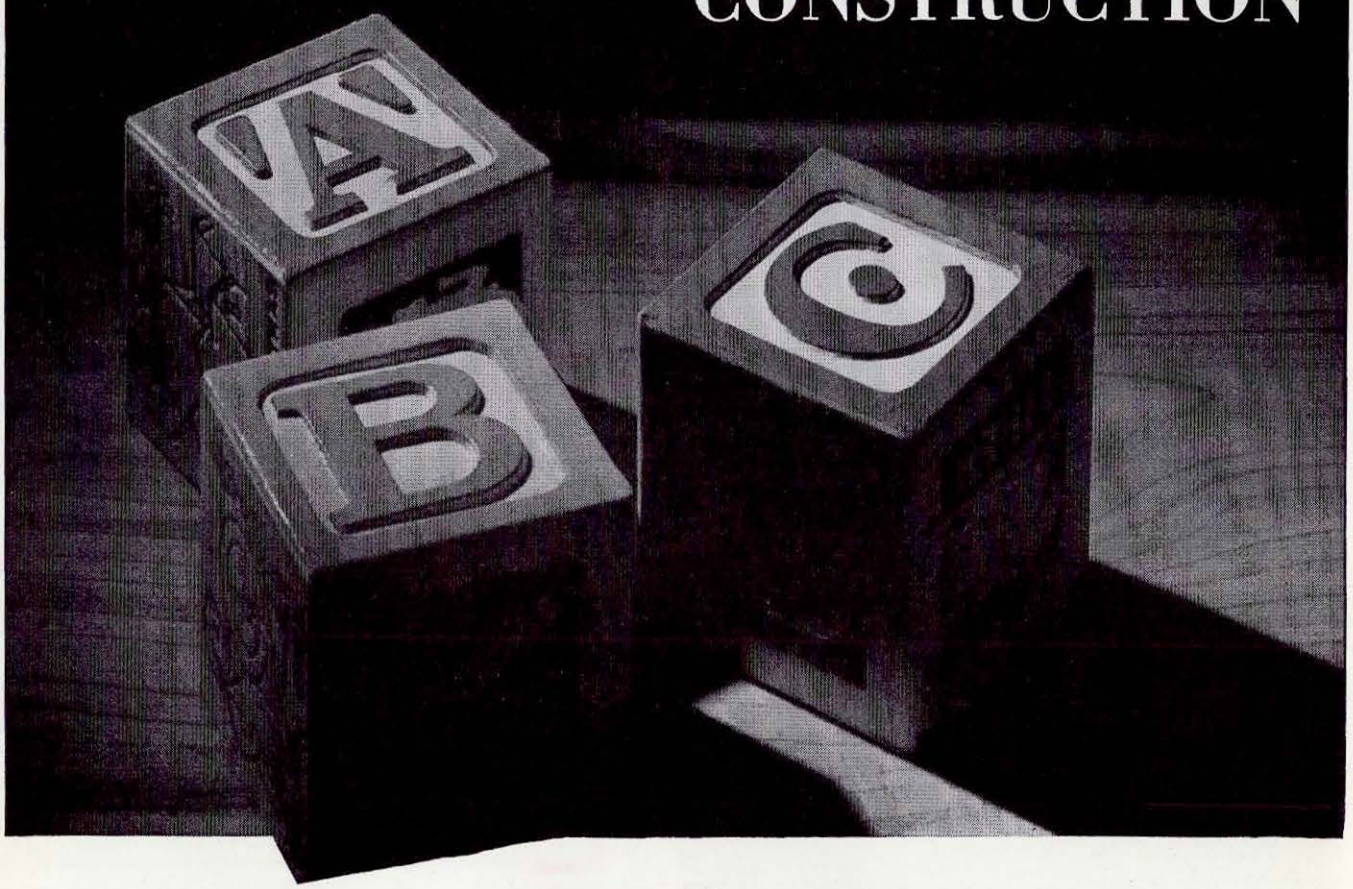

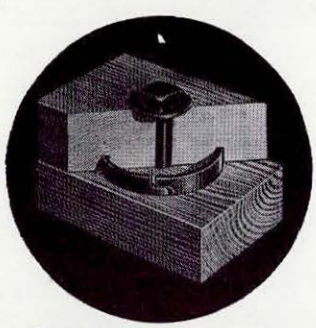

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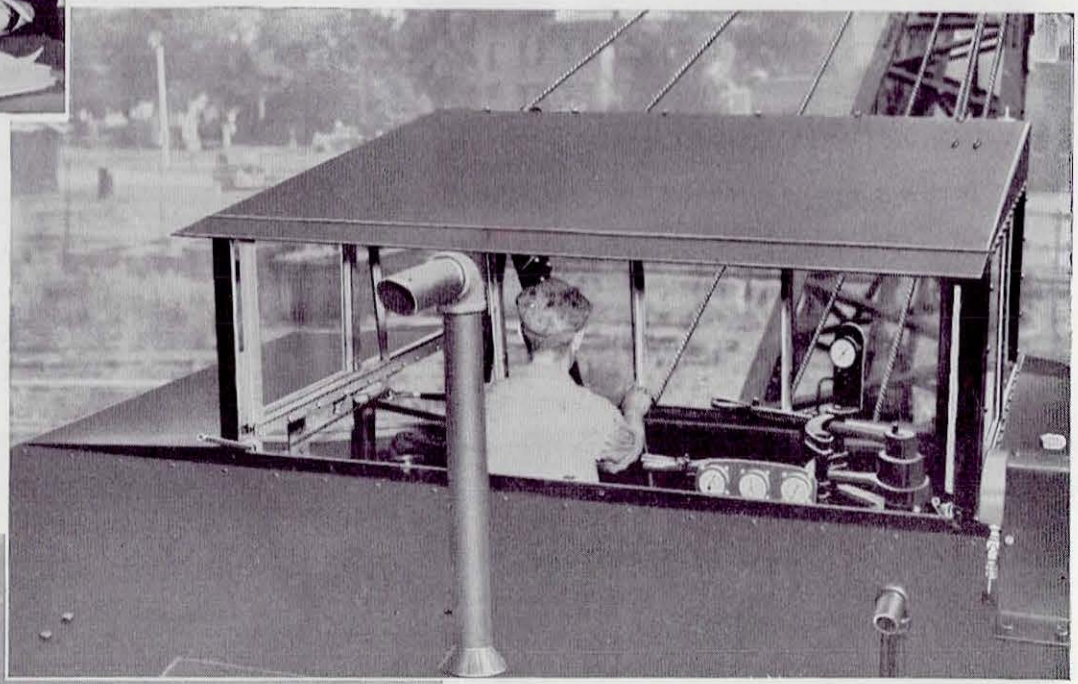

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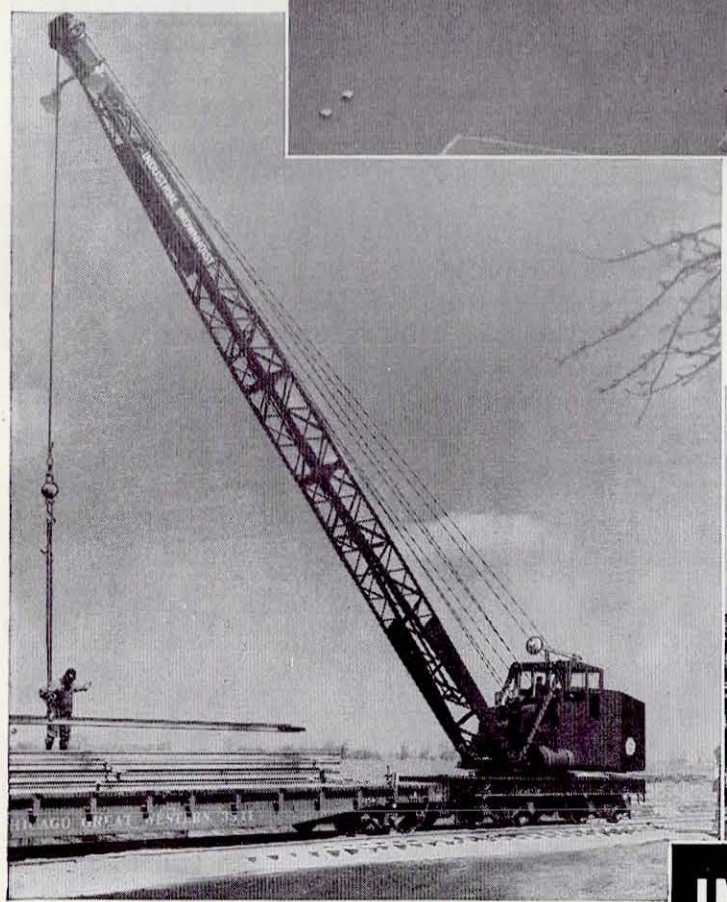

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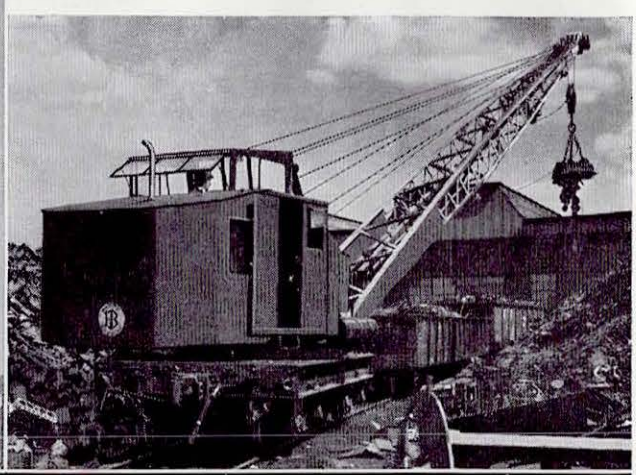

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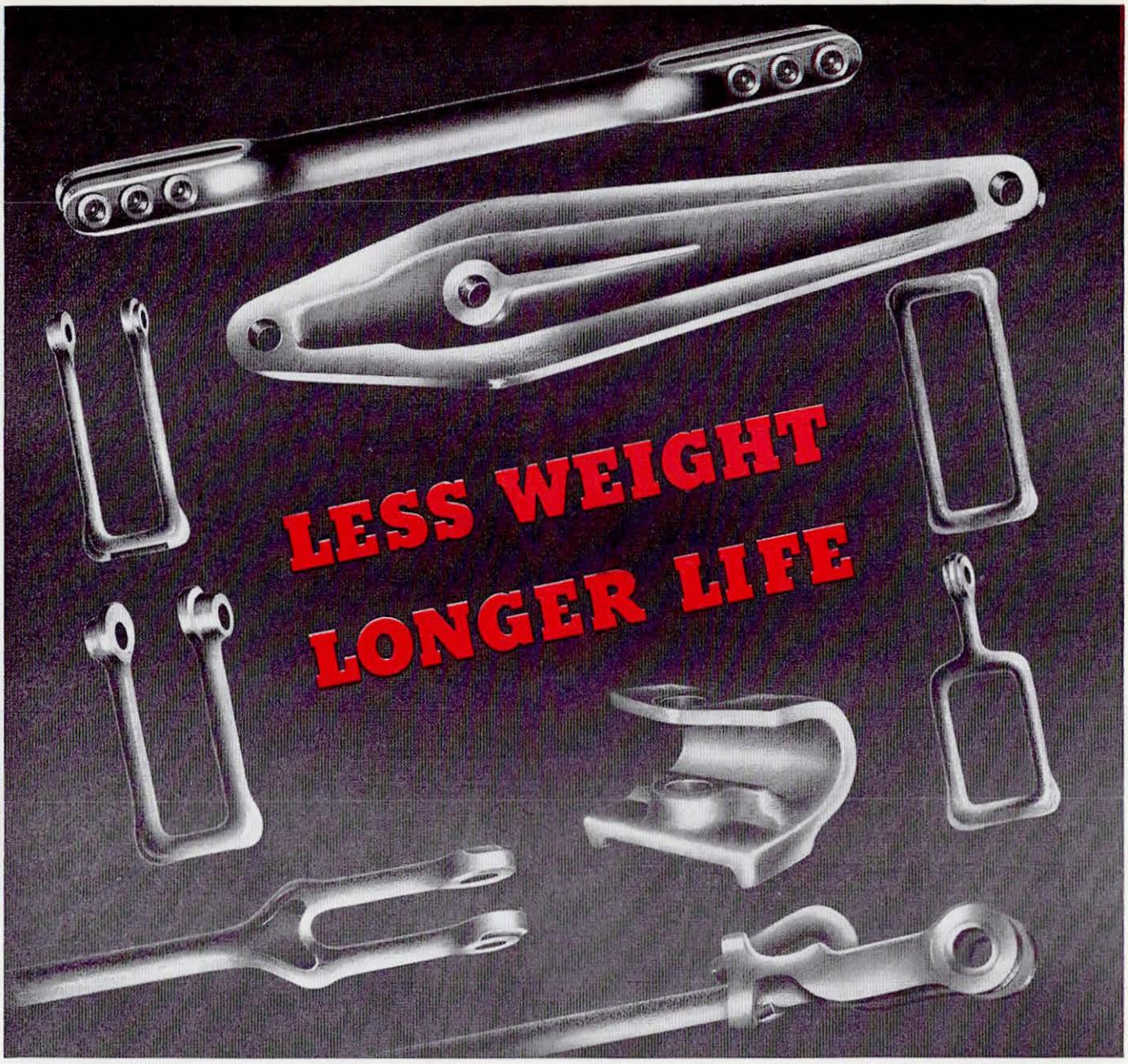

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Nalco-treated locomotives deliver the power and move traffic on schedule.

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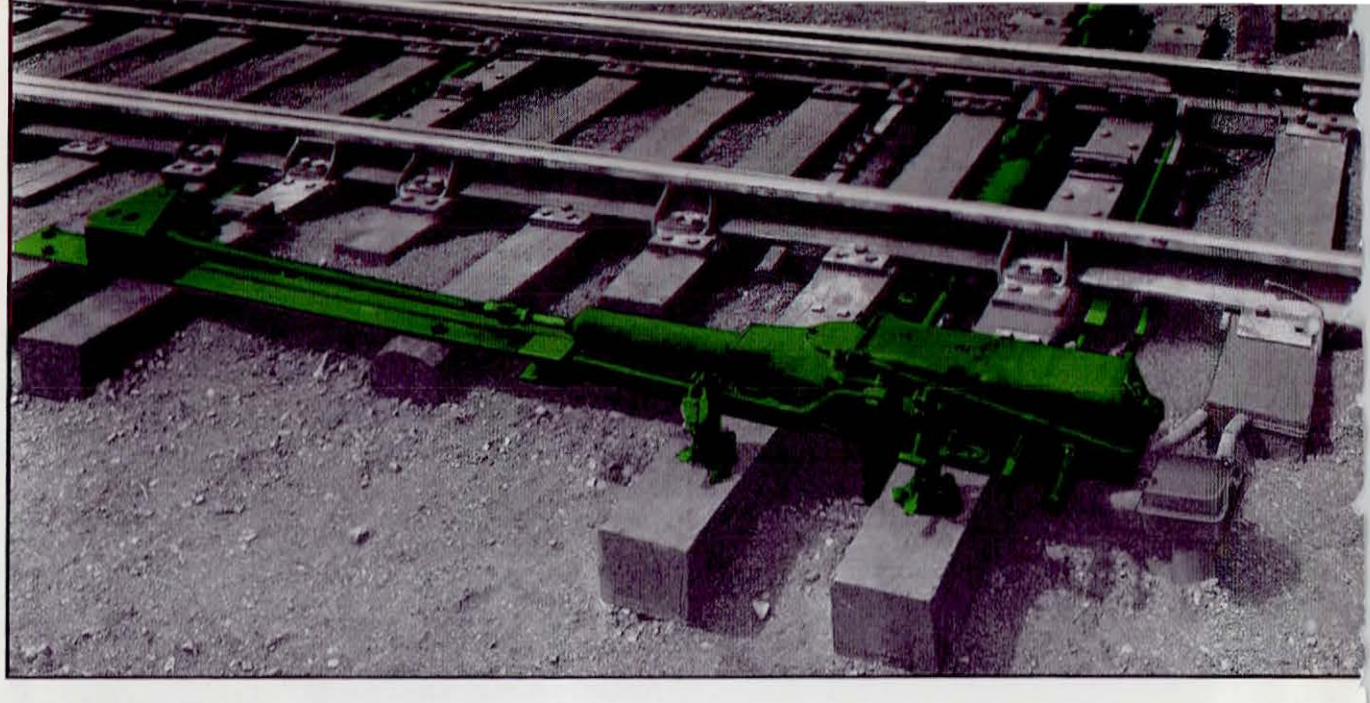

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5. The S-20 may be converted into an S-21 (with target) in the field.
6. Sturdy construction results in minimum maintenance.

WHEN spring switches are equipped with "Union" Facing Point Locks, traffic is accelerated with safety because speed restrictions are not necessary for facing point moves. The resultant elimination of slow orders justifies the application of more spring switches to a given main line division.

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First introduced in 1932, the "Union" Facing Point Lock has speeded transportation at over 700 locations. » » »

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SWITCHING EFFICIENCY: The figures on yard engine-hours in relation to car-miles do not make the favorable showing that road engine-hours do—as the leading editorial herein discloses. The reason is clear: You can add more cars to a train —but switching a longer train takes proportionately more time than switching a shorter one. Yard efficiency can be increased, but not by the same methods that are used to obtain greater efficiency on the road. The figures suggest that the way to secure improvement is by contriving means to reduce the amount of switching required (trucking replacing uneconomical car movement, for instance) and by concentrating the work in the most efficient yards.

●

EASTMAN'S NEW HELPERS: The Office of Defense Transportation added some distinguished personnel to its staff during the past week. C. E. Johnston, chairman of the Western Association of Railway Executives, became the associate director of the ODT's Railway Division, in charge of Western territory (with J. M. Baths previously named as deputy associate director in this territory). President J. M. Hood of the Short Line Association has been named associate director in charge of Southern territory, W. G. Curren of the B. & O. having previously been given jurisdiction in Eastern territory, with title of associate director. Neither Mr. Johnston nor Mr. Hood will relinquish their regular railroad connections in assuming their ODT duties. Meantime, P. A. Hollar of the P. R. R. has become acting director of the materials section, ODT, taking the place of Col. C. D. Young, who has been called up for military duty.

●

LABOR TROUBLE COOKING?: Railway labor leaders called at the White house last week with a proposal that a permanent "fact-finding" board be established to take over labor cases which may come up and which can't be settled by direct negotiation or mediation. Several questions occur: would the Sirs and Brothers be asking for this if they didn't expect to stir up trouble? Why give them a fact-finding board when past experience shows they won't pay any attention to its findings unless it hands them what they want? Maybe the boys feel that, this time, they can get a board of yes-men which would stay in constant session, dishing out the carriers' money for the duration. After all, last Fall's independent board was probably an exception—what the biologists call a "sport," not likely to occur soon again.

●

ALASKA HIGHWAY: Well, they are going to build that Alaska highway anyhow. If it is a military necessity, no loyal American will oppose it—but it is hard to understand why a railroad wouldn't do the job far better (as the Burma railway has always been able to deliver more goods, and at a fraction of the cost, than the Burma Road could carry away); and be easier to keep open in the winter. See *Railway Age*, May 17, 1941, page 845.

hours than it is to get them with relation to switch engine-hours or engine-miles.

The reason why yard service performance is so difficult to keep in line with the advancement in train service performance is that the latter is essentially a "mass production" job and the former is "retail" in character. A larger road locomotive will handle more tons at higher speed, with the same number of men in the train crew as formerly—but, when it comes to assembling from shippers or delivering to consignees the larger number of cars which go to make up that larger train, a proportionately *greater* number of switch engine movements will be required. It is possible to economize in yard service, of course, but the methods toward such economy are, generally, of a different character than those which bring economies in road service.

For example, the shipper who is impressed with the importance of loading and unloading cars promptly, and loading them heavily, may be critical if a string of cars is not "pulled" as soon as he finishes his work on them. If prompt movement is needed in order to get these cars into early outgoing trains, his criticism is well taken. On the other hand, if no outgoing trains are to depart for some little time, it may be true economy of yard-engine time to allow those cars to wait a while before they are "pulled." At a time when maximum utilization of equipment is desirable there needs to be economy of yard-engine time, as well as in that of road engines and freight cars. Co-operation of yard forces and shippers can conserve yard-engine time by arranging the loading of cars in an order which will minimize switching in train make-up.

To Improve Switching Efficiency, Eliminate It

One of the best ways to conserve switch-engine time is to eliminate it entirely, in one way or another. For example, "main-tracking" of as many trains as possible is an effective device to that end—as is also the concentration of as much switching as possible in the most efficient yards, leaving only that to be done at intermediate terminals which is not practicable elsewhere. Most roads keep a careful check on the comparative performance of their various yards—and managements are well informed as to those situations where physical conditions, personnel, shipper demands, and other considerations make either for costly or efficient performance. Some of these conditions are doubtless known to be susceptible to improvement and, if such be the case, then there will be no better time than the present to bring such improvement about.

The maximum attainable efficiency in yard work—by the elimination of all unnecessary movements (through shipper co-operation and careful planning of each day's work), by concentrating work insofar as possible in the most efficient yards, and by the elimination of switching movements where less costly service (trucking, for instance) can be substituted—is just as necessary a part of the railroads' contribution to the winning of the war as is the more spectacular operation of heavy trains at maximum reasonable speeds on the main line.

Greatly Improved R. R. Results—1930 and 1941

The fact that—as disclosed by statistics of the Interstate Commerce Commission recently issued—there was a difference of only 1.3 per cent between the gross earnings (total operating revenues) of Class I railways in 1930 and 1941, affords opportunity for some unusually interesting and significant comparisons between results in these two years.

The difference in gross was an increase; and, as shown by statistics in the accompanying table, the railroads, to get such a small increase in gross, had to render in 1941 increases over 1930 of 23.2 per cent in freight service (tons carried one mile) and 9½ per cent in passenger service (passengers carried one mile). The reason why they had to render so much more service to get such a small increase in earnings was that rates were lower. Average revenue per ton-mile in 1941 was 12 per cent less, and average revenue per passenger-mile almost 36 per cent less, than in 1930. The advances recently authorized of about 6 per cent in freight rates and 10 per cent in passenger rates

Class I Railway Results in 1930 and 1941

	1930	1941	Per cent Increase or Decrease
Total Operating Revenues	$5,280,148,000	$5,346,700,000	+1.3
Total Operating Expenses	3,930,929,000	3,664,175,000	−6.8
Ratio Oper. Expenses to Revenues	74.4	68.5	−7.9
Net Revenue from Railway Operations	$1,349,219,000	$1,682,525,000	+24.7
Taxes (Ordinary)	348,554,000	408,042,000	+17.1
Payroll taxes	.....	138,029,000	...
Total Taxes	348,554,000	546,071,000	+56.7
Equipment & Joint Facility Rentals	131,788,000	136,951,000	+3.9
Net Railway Operating Income	868,877,000	999,503,000	+15.0
Revenue Ton-Miles	383,449,588,000	472,489,500,000	+23.2
Number Freight Locomotives On Line	28,585	21,778	−23.8
Ton-Miles Per Locomotive	13,399,000	21,696,000	+62.0
Number Freight Cars On Line	2,466,614	1,905,115	−22.8
Ton-Miles Per Freight Car	114,894	248,016	+116.0
Freight Earnings	$4,083,242,000	$4,447,568,000	+8.9
Average Rev. Per Ton-Mile	1.063¢	0.935¢	−12.0
Revenue Passenger-Miles	26,814,825,000	29,350,358,000	+9.5
Passenger Earnings	$729,470,000	$514,687,000	−29.4
Average Rev. Per Passgr.-Mile	2.72¢	1.75¢	−35.7
Total Number of Employees	1,487,839	1,139,723	−23.4
Total Compensation	$2,551,000,000	$2,269,000,000	−11.1
Average Compensation	1,714	1,991	+16.2
Compensation Chargeable to Oper. Exp.	2,367,000,000	2,110,000,000	−10.9
Other Operating Expenses	1,564,000,000	1,554,000,000	−0.6
Operating Expenses (Purposes):			
Maintenance of Way and Structures	705,472,000	603,111,000	−14.5
Maintenance of Equipment	1,019,265,000	992,511,000	−2.6
Transportation	1,848,183,000	1,774,977,000	−4.0
Traffic	127,833,000	111,888,000	−12.5
General	191,238,000	138,214,000	−27.7
All Other	38,938,000	43,474,000	+11.6

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BRAKING — A PECULIAR JOB: Brake problems aren't so easy for the non-specialist to appreciate, because they are the exact opposite of most engineering tasks. That is, most engineers change some other kind of energy into mechanical energy, while the brake technician's job is to transform mechanical energy into heat. Thus is introduced an informative paper elsewhere in this issue—which clarifies the why and the how of the electro-pneumatic brake. The author is Joseph C. McCune of the Westinghouse Air Brake Company.

SWITCHING EFFICIENCY: The figures on yard engine-hours in relation to car-miles do not make the favorable showing that road engine-hours do—as the leading editorial herein discloses. The reason is clear: You can add more cars to a train —but switching a longer train takes proportionately more time than switching a shorter one. Yard efficiency can be increased, but not by the same methods that are used to obtain greater efficiency on the road. The figures suggest that the way to secure improvement is by contriving means to reduce the amount of switching required (trucking replacing uneconomical car movement, for instance) and by concentrating the work in the most efficient yards.

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EASTMAN'S NEW HELPERS: The Office of Defense Transportation added some distinguished personnel to its staff during the past week. C. E. Johnston, chairman of the Western Association of Railway Executives, became the associate director of the ODT's Railway Division, in charge of Western territory (with J. M. Baths previously named as deputy associate director in this territory). President J. M. Hood of the Short Line Association has been named associate director in charge of Southern territory, W. G. Curren of the B. & O. having previously been given jurisdiction in Eastern territory, with title of associate director. Neither Mr. Johnston nor Mr. Hood will relinquish their regular railroad connections in assuming their ODT duties. Meantime, P. A. Hollar of the P. R. R. has become acting director of the materials section, ODT, taking the place of Col. C. D. Young, who has been called up for military duty.

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LABOR TROUBLE COOKING?: Railway labor leaders called at the White house last week with a proposal that a permanent "fact-finding" board be established to take over labor cases which may come up and which can't be settled by direct negotiation or mediation. Several questions occur: would the Sirs and Brothers be asking for this if they didn't expect to stir up trouble? Why give them a fact-finding board when past experience shows they won't pay any attention to its findings unless it hands them what they want? Maybe the boys feel that, this time, they can get a board of yes-men which would stay in constant session, dishing out the carriers' money for the duration. After all, last Fall's independent board was probably an exception—what the biologists call a "sport," not likely to occur soon again.

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ALASKA HIGHWAY: Well, they are going to build that Alaska highway anyhow. If it is a military necessity, no loyal American will oppose it—but it is hard to understand why a railroad wouldn't do the job far better (as the Burma railway has always been able to deliver more goods, and at a fraction of the cost, than the Burma Road could carry away); and be easier to keep open in the winter. See *Railway Age,* May 17, 1941, page 845.

WHO SERVES THE RAILROADS SERVES AMERICA!

AMERICAN railroads are doing a grand job in moving our fast growing army of men, materials and supplies with safety and dispatch. In this All Out For Victory program GM 5400 Hp. Diesel freight locomotives are outstanding by their ability to:

(a) Effect savings in train miles as much as 50 per cent.

(b) Release for other important service as many as five heavy steam locomotives for each Diesel locomotive operated.

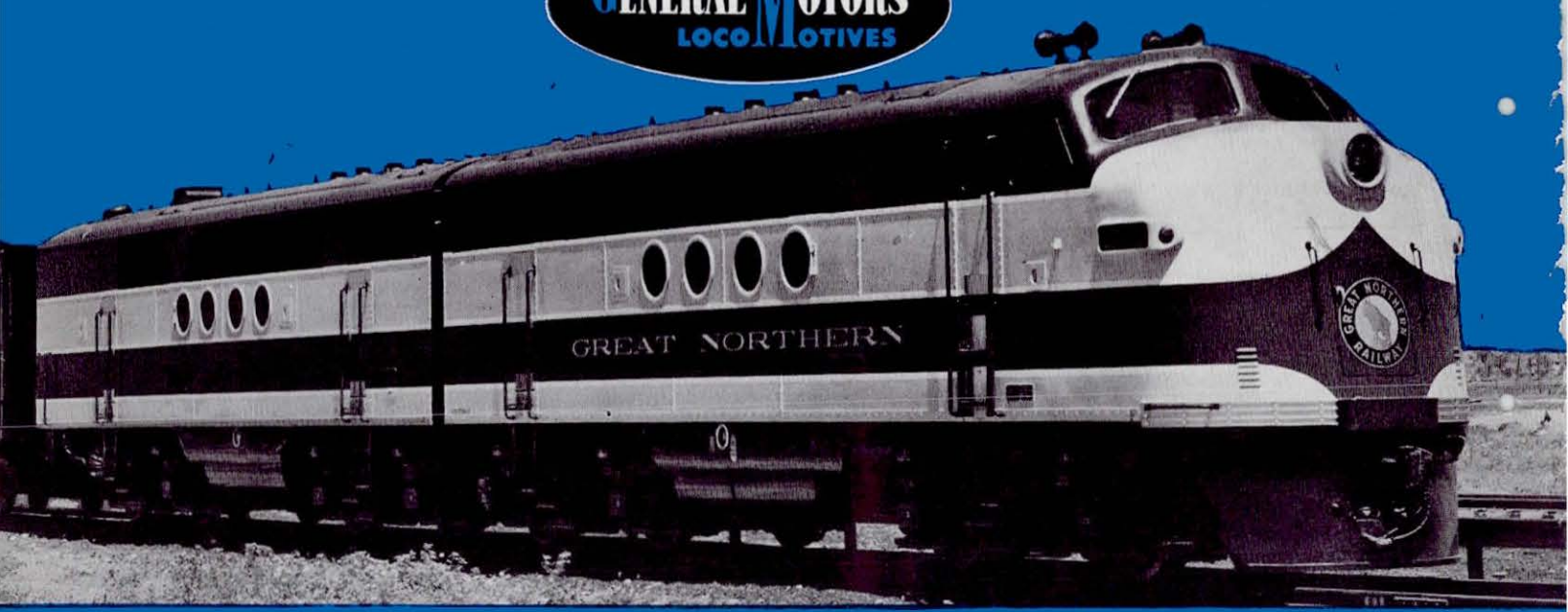
(c) Increase traffic hauling capacity.

(d) Provide faster schedules by eliminating many service delays required for steam locomotives.

(e) Increase carrying capacity of existing track facilities without expensive rail replacements and rebuilding of bridge structures.

MODERNIZE TO MOBILIZE WITH GM DIESELS

GENERAL MOTORS LOCOMOTIVES



ELECTRO-MOTIVE DIVISION

GENERAL MOTORS CORPORATION LA GRANGE, ILLINOIS, U.S.A.

RAILWAY AGE

Economy in Yard Operation

The percentage of railroad switching being done by Diesel-electric locomotives continues to advance rapidly. In freight service, for example, in 1941, about 11.5 per cent of all switching locomotive-hours was performed by Diesel locomotives. The coal-burning steam locomotive, however, still does the bulk, even though a declining proportion, of this class of work—77 per cent of all switching locomotive-hours in 1941 having been performed by coal-burners. Oil-burning steam locomotives accounted for less switching service than did Diesel locomotives, just under 11 per cent of locomotive-hours being attributed to such engines.

In the switching of passenger cars, the Diesel-electric locomotive has achieved a position of even greater relative importance than in the yard-handling of freight cars. For instance, in 1941, more than 20 per cent of passenger switching locomotive-hours was accounted for by Diesel locomotives. From a percentage standpoint, the growth of the Diesel in switching service has been spectacular. Detailed figures (shown in the accompanying table) go back only to 1936, but in that year Diesel locomotives accounted for less than 1¼ per cent of freight switching. Two years later this percentage had risen to more than 4 per cent; and the 11½ per cent attained in 1941 is not yet the end.

Aside from other advantages which the Diesel locomotive affords for switching work, its availability for a large proportion of the 24 hours constitutes, perhaps, the brightest spot in the current statistical picture of yard operating performance. As the accompanying table reveals, the average internal combustion switch engine in 1941 worked 18.8 hours per day, as compared to 10.2 hours for the coal-burning locomotive. Apart from this one factor of more intensive locomotive utilization, the published figures of yard performance evidence the difficulty which is experienced in effecting improvement in this sector of railroad operation. Yard-engine hours per 100 loaded car-miles were virtually static throughout the six years covered by the table. There was some decrease in the ratio of switching locomotive-miles in relation to loaded car-miles, but this improvement was not spectacular. During this same period from 1936 to 1941, net ton-miles per train hour showed an increase of 23 per cent. Train speed increased 4½ per cent, gross tons (trailing load) per train rose more than 14 per cent, and cars per train went up almost 10 per cent.

Economy Comes Easier in Road Service

The yard engine-hour is the unit of performance in yard work, as the train-hour is in road operation. Operating efficiency can be improved, either by reducing the cost of performing either of these units of work, or by getting a larger proportion of ton-miles in relation to either unit. Right now, with equipment none too plentiful and traffic rapidly growing because of the war effort, the avenue of greater output in ton-miles per train-hour or per engine-hour is more desirable (as well as more practicable) than reduced expense per unit. Experience, and the figures, indicate that it is easier to get much larger service in relation to train-

Yard Service Performance, 1936-1941

	1936	1937	1938	1939	1940	1941
Yard Switching Loco. Hours (Freight)	38,200,340	40,464,796	32,761,784	36,657,621	40,312,145	48,617,261
Loaded Freight Car-Miles (000)	13,941,810	14,606,017	12,186,179	13,553,272	14,684,197	18,069,276
Switch Loco.-Hours per 100 Loaded Car-Miles	3.65	3.61	3.72	3.70	3.64	3.72
Freight Train-Hours	30,738,888	31,176,558	25,512,848	27,117,916	28,933,375	34,442,752
Switch Loco.-Hours per Freight Train-Hour	1.24	1.30	1.28	1.35	1.39	1.41
Yard and Train Switch Loco.-Miles per 100 Loaded Frt. Car-Miles	1.99	1.99	1.95	1.94	1.96	1.91
Freight Switch Loco.-Miles (Diesel)	464,598	780,326	1,375,597	2,250,316	3,588,747	5,569,486
Per Cent Diesel to Total Switch Loco.-Miles (Freight)	1.22	1.93	4.20	6.14	8.90	11.46
Hours per Yard Loco.-Day						
Coal-Burning Steam	8.5	9.0	7.3	8.1	8.8	10.2
Gasoline, Gas-Elec., Diesel	13.2	15.4	16.5	17.8	18.4	18.8
All Serviceable Locos.	11.5	11.7	10.8	11.4	11.9	12.9

hours than it is to get them with relation to switch engine-hours or engine-miles.

The reason why yard service performance is so difficult to keep in line with the advancement in train service performance is that the latter is essentially a "mass production" job and the former is "retail" in character. A larger road locomotive will handle more tons at higher speed, with the same number of men in the train crew as formerly—but, when it comes to assembling from shippers or delivering to consignees the larger number of cars which go to make up that larger train, a proportionately *greater* number of switch engine movements will be required. It is possible to economize in yard service, of course, but the methods toward such economy are, generally, of a different character than those which bring economies in road service.

For example, the shipper who is impressed with the importance of loading and unloading cars promptly, and loading them heavily, may be critical if a string of cars is not "pulled" as soon as he finishes his work on them. If prompt movement is needed in order to get these cars into early outgoing trains, his criticism is well taken. On the other hand, if no outgoing trains are to depart for some little time, it may be true economy of yard-engine time to allow those cars to wait a while before they are "pulled." At a time when maximum utilization of equipment is desirable there needs to be economy of yard-engine time, as well as in that of road engines and freight cars. Co-operation of yard forces and shippers can conserve yard-engine time by arranging the loading of cars in an order which will minimize switching in train make-up.

To Improve Switching Efficiency, Eliminate It

One of the best ways to conserve switch-engine time is to eliminate it entirely, in one way or another. For example, "main-tracking" of as many trains as possible is an effective device to that end—as is also the concentration of as much switching as possible in the most efficient yards, leaving only that to be done at intermediate terminals which is not practicable elsewhere. Most roads keep a careful check on the comparative performance of their various yards—and managements are well informed as to those situations where physical conditions, personnel, shipper demands, and other considerations make either for costly or efficient performance. Some of these conditions are doubtless known to be susceptible to improvement and, if such be the case, then there will be no better time than the present to bring such improvement about.

The maximum attainable efficiency in yard work—by the elimination of all unnecessary movements (through shipper co-operation and careful planning of each day's work), by concentrating work insofar as possible in the most efficient yards, and by the elimination of switching movements where less costly service (trucking, for instance) can be substituted—is just as necessary a part of the railroads' contribution to the winning of the war as is the more spectacular operation of heavy trains at maximum reasonable speeds on the main line.

Greatly Improved R. R. Results—1930 and 1941

The fact that—as disclosed by statistics of the Interstate Commerce Commission recently issued—there was a difference of only 1.3 per cent between the gross earnings (total operating revenues) of Class I railways in 1930 and 1941, affords opportunity for some unusually interesting and significant comparisons between results in these two years.

The difference in gross was an increase; and, as shown by statistics in the accompanying table, the railroads, to get such a small increase in gross, had to render in 1941 increases over 1930 of 23.2 per cent in freight service (tons carried one mile) and 9½ per cent in passenger service (passengers carried one mile). The reason why they had to render so much more service to get such a small increase in earnings was that rates were lower. Average revenue per ton-mile in 1941 was 12 per cent less, and average revenue per passenger-mile almost 36 per cent less, than in 1930. The advances recently authorized of about 6 per cent in freight rates and 10 per cent in passenger rates

Class I Railway Results in 1930 and 1941

	1930	1941	Per cent Increase or Decrease
Total Operating Revenues	$5,280,148,000	$5,346,700,000	+1.3
Total Operating Expenses	3,930,929,000	3,664,175,000	−6.8
Ratio Oper. Expenses to Revenues	74.4	68.5	−7.9
Net Revenue from Railway Operations	$1,349,219,000	$1,682,525,000	+24.7
Taxes (Ordinary)	348,554,000	408,042,000	+17.1
Payroll taxes	.....	138,029,000	...
Total Taxes	348,554,000	546,071,000	+56.7
Equipment & Joint Facility Rentals	131,788,000	136,951,000	+3.9
Net Railway Operating Income	868,877,000	999,503,000	+15.0
Revenue Ton-Miles	383,449,588,000	472,489,500,000	+23.2
Number Freight Locomotives On Line	28,585	21,778	−23.8
Ton-Miles Per Locomotive	13,399,000	21,696,000	+62.0
Number Freight Cars On Line	2,466,614	1,905,115	−22.8
Ton-Miles Per Freight Car	114,894	248,016	+116.0
Freight Earnings	$4,083,242,000	$4,447,568,000	+8.9
Average Rev. Per Ton-Mile	1.063¢	0.935¢	−12.0
Revenue Passenger-Miles	26,814,825,000	29,350,358,000	+9.5
Passenger Earnings	$729,470,000	$514,687,000	−29.4
Average Rev. Per Passgr.-Mile	2.72¢	1.75¢	−35.7
Total Number of Employees	1,487,839	1,139,723	−23.4
Total Compensation	$2,551,000,000	$2,269,000,000	−11.1
Average Compensation	1,714	1,991	+16.2
Compensation Chargeable to Oper. Exp.	2,367,000,000	2,110,000,000	−10.9
Other Operating Expenses	1,564,000,000	1,554,000,000	−0.6
Operating Expenses (Purposes):			
Maintenance of Way and Structures	705,472,000	603,111,000	−14.5
Maintenance of Equipment	1,019,265,000	992,511,000	−2.6
Transportation	1,848,183,000	1,774,977,000	−4.0
Traffic	127,833,000	111,888,000	−12.5
General	191,238,000	138,214,000	−27.7
All Other	38,938,000	43,474,000	+11.6

obviously will fall far short of offsetting the declines since 1930.

In spite of the largely increased traffic handled, operating expenses in 1941 were 6.8 per cent less than in 1930—due almost entirely, as the figures show, to a reduction in the number of employees of almost 23½ per cent. Average compensation per employee was $1,714 in 1930 and $1,991 in 1941, an increase of over 16 per cent; but compensation of employees chargeable to operating expenses declined from $2,377 million in 1930 to about $2,110 million in 1941. Operating expenses other than employees' compensation were almost the same—about $1,564 million in 1930 and $1,554 million in 1941.

Relatively very much the largest increase in outgo was in taxes; and their increase was principally due to payroll taxes, none of which were paid in 1930. Ordinary taxes in 1930 were $349 million and in 1941 were $408 million, an increase of 17 per cent; but payroll taxes of $138 million in 1941 made last year's total taxes $546 million—an increase over 1930 of almost 57 per cent. As these payroll taxes are paid entirely for the benefit of employees, they should be considered part of their compensation. They amounted in 1941 to $121 per employee. Thus, including payroll taxes, actual average compensation per employee last year was $2,112, or 23 per cent more than in 1930.

With an increase of only 1.3 per cent, or $67 million, in gross earnings, and in spite of increases of 16 per cent in the average wage of employees, and of 57 per cent, or $197 million in taxes, the railways succeeded in getting an increase of 15 per cent, or $131 million, in net operating income. Not bad for a "decadent" industry!

Some of the most remarkable statistics are those showing the increased efficiency with which locomotives and cars were used. Because 23 per cent more freight service was rendered in 1941 than in 1930 with 6,807 fewer freight locomotives and about 561,000 fewer freight cars, there was an increase in the freight service rendered with each locomotive of 62 per cent and an increase in the amount of service rendered with each freight car of 116 per cent. This was partly due to depression conditions in 1930 that prevented full use of equipment.

Total expenditures for maintenance—i. e., of both permanent structures and equipment—were $1,725 million in 1930 and $1,596 million in 1941. This reduction of only 7½ per cent compares with very much larger reductions during the depression years. In fact, total expenditures for maintenance last year were 17 per cent larger than in 1940, and 45 per cent, or $500 million, larger than as lately as 1938. Their recent large increases indicate the heroic efforts the railways are making to put their properties in condition for handling the greatly increased current and prospective traffic, and why they so imperatively need larger allocations of materials.

A Revolution in Earth Grading Methods

During the last eight or ten years, as pointed out in an article elsewhere in this issue, changes in earth grading methods and equipment have come about so rapidly and completely as to constitute a revolution. Of particular significance with regard to all of this equipment is the fact that it is either gasoline- or Diesel-engine operated or propelled and is designed for use entirely independent of railway tracks. Through the use of this equipment, the selection and blending of materials, controlled spreading, the addition of moisture where required, and the designed routing of equipment, subsidence in fills can be practically eliminated; the seasoning periods of new embankments, with their accompanying high track maintenance costs, can be cut from months, and even years, to days or weeks; construction periods can be reduced to a fraction of the time required formerly; and, withal, on most classes of work, not a single unit of train-service equipment need be taken from regular rail operation to carry them out.

That subsidence in fills, the concern of construction, operating and maintenance officers alike, can be practically eliminated through modern methods and equipment is seen in the extensive grading on the 30-mile Shasta Line diversion of the Southern Pacific in northern California, where shrinkage in fills as high as 100 ft. has been held to less than one per cent. In fact, on this project, and on others, embankments have been built in which the material placed has been compacted to a density equal to or greater than that of the same material in its original state. Every maintenance man knows what this means in reduced track maintenance costs, and every operating man knows its important effects on train operation.

Today, in the light of these developments, slow orders over new and improved lines can be practically eliminated—to cite only the case of the recent 3.4-mile line change on the Boston & Maine around the government's Birch Hill dam and reservoir project in Massachusetts, where full main-line train speeds were inaugurated within 24 hr. after the new alinement was put in service. And of equal importance is the fact that modern methods and equipment are as well adapted to smaller track construction and reconstruction projects and to a wide range of routine maintenance grading, including bank widening and strengthening, ditch enlargement and cleaning, channel changes and restoration work, and general right-of-way leveling and sloping. Furthermore, and of no small importance, several of the newer units of equipment are especially adapted to a wide range of emergency work, including the clearing up of slides, the filling of washouts, the construction of shoo-fly tracks, and even the removal of equipment and lading that may foul the tracks after derailments.

In these important developments in grading methods and equipment, railway men can claim but a small part,

these developments having taken place during a period while railway expansion and construction generally were at a low ebb; others have shown the way, even on such outstanding railway grading projects as have been carried out in recent years. But this need in no way interfere with the full adoption of these developments. Faced with imperative programs of expansion, line improvements and higher standards of maintenance generally under the demands of war-time transportation, all of which involve grading of one character or another, railway men must take advantage of these developments to the fullest extent possible to speed the completion of work, to avoid unnecessary drains on available labor, to minimize the use of locomotives and cars, to prevent interference with traffic, and to keep costs to a minimum.

Collaboration or Coercion?

It is quite likely—in view of traffic prospects and the slowness with which the authorities are making available materials needed to construct new equipment—that the nation's transportation plant will be taxed to its utmost this year. If there is congestion, it will probably result in embargoes or other impediments or delays to all traffic except that which is closely related to the war effort.

Drastic mandatory action, revolutionary in character, is not what experience or the co-operative frame of mind in the transportation business indicate is needed to cope with this situation. Nation-wide uniform orders disregard so many specific situations that they have the effect of creating more difficulties than they solve. Intelligence and patriotism locally applied to each instance of sub-standard performance will eliminate more waste than any "broad brush" strokes of bureaucratic brilliance.

Basically, the job that needs doing is for the railroads, the forwarders, and the trucks so to consolidate or centralize shipments that the average per-vehicle merchandise loadings for each form of transportation may be raised by, say, 20 per cent. Carload and truckload shippers who are not now compelled to load to the marked capacity of the car could well be called on to increase their minimum loadings to the highest average loadings obtaining in any district or region in 1941. Limitations on length of trains by law or union agreement should be suspended for the duration, and trainloads could be correspondingly increased. As far as trucks are concerned, these also should be loaded to the maximum consistent with efficient use of the equipment and permitted by law in the states they traverse.

More effective, probably, than any other device to economize transportation equipment would be revision of freight rates so they would reflect the relative economy of each form of transportation, eliminating duplication of the service of economical carriers by uneconomic competitors. If these steps were taken, there can scarcely be any doubt that the very maximum possible utilization would be secured from existing equipment. If a reasonable quantity of new rolling stock is provided, quite likely serious shortages even to civilian traffic would thereby be avoided, certainly for the balance of 1942.

Is it not better to have thousands of shippers, and officers and employees of carriers—each one of them using his ingenuity to try to increase the efficiency of equipment utilization—than to say to them in effect: "Never mind using your brains, just obey orders?" In your observer's opinion, all that is necessary is for Mr. Eastman to issue an "urgent appeal", "respectfully requesting" that the above-suggested and other similar steps be taken. With respect to train length limitation, it might be necessary for the President to exercise his war powers, but, certainly no such action is necessary in order to assure the intelligent and patriotic co-operation of carriers and shippers.

In fact, mandatory action might well defeat its own end. This was exactly what Mr. McAdoo did in 1918—told the shipping and transportation community, in effect, that their job was to obey orders; he would supply the necessary brain work. The record shows the effect of that policy.

Of course, it would be necessary to set up regional committees to stimulate action—but this would be all to the good. The more people there are who accept a moral responsibility to prevent waste of transportation facilities, the better this condition will be policed. Public-spirited regional committees could not only throw the spotlight on light-loaders, but they could, and doubtless also would, bring the equipment-delayers into unpleasant prominence.

Then, if issuing orders finally became necessary, only a rifle directed at the offender would be needed—not a shot-gun which would riddle the innocent multitude in order to bring a few malefactors to book.

There seems to be very little appreciation of the significance of the spirit behind the order setting up the ODT and the way Mr. Eastman has so far looked at his job. Actually what is contemplated is—quite likely—the largest-scale instance of voluntary industrial collaboration ever witnessed. If it can be successfully carried through, a landmark in high-minded business behavior will have been established; and an unprecedented achievement in government-industry co-operation. Since we are fighting to defend democracy and political freedom—what could be more fitting than to demonstrate to America and the world just how effective conscientious liberty can be in meeting a most complex economic problem? It is a challenge to the shipping and transportation community—as well as to the ODT and other governmental authorities who deal with transportation.

Electro-Pneumatic Brakes for High-Speed Trains*

A discussion of the important characteristics of this type of equipment with particular reference to the electrical features involved

By Joseph C. McCune

Westinghouse Air Brake Company

TO understand why electro-pneumatic brakes have been adopted for modern high-speed trains requires some comprehension of the limitations of a strictly pneumatic system and some grasp of the part played by the brake in modern transportation.

Because the work done by the brake is of a negative character, it frequently happens that the technical difficulties involved in producing a satisfactory brake, and the power embodied in it, are not fully visualized by those who are not directly in contact with the braking situation. Many engineers are confronted with the problem of transferring heat energy into mechanical energy, as in steam or gas engines. Electrical engineers change, in motors, electrical energy into mechanical energy. Engineers, in general, are mainly preoccupied with obtaining mechanical energy from some other form of energy, whereas brake engineers, as a special group, deal with the transformation of mechanical energy into heat. Although this transformation is the reverse of that ordinarily encountered, it is evident that many technical problems must be met, a consideration of which is not pertinent to this paper.

It is believed, however, that some mention should be made of the power requirements of the modern brake. Neglecting friction, wind resistance, etc., it is obvious that, measured at the rail, the motor torque and the brake torque must be equal if a train is to be accelerated or decelerated at the same rate. But in actual practice, the brake torque is greater than the motor torque since the rate of deceleration exceeds the rate of acceleration. Furthermore, this higher brake torque is produced at the highest speeds. Consequently, since horsepower is proportional to the product of torque and velocity, the horsepower involved in deceleration is many times as great as the horsepower involved in acceleration. Thus, to decelerate a 1,000-ton train, at 100 m. p. h., at the rate of 2.2 m. p. h. per sec., involves dissipation at the rate of 53,500 hp.

Horsepower may be used to indicate the rate at which a brake dissipates energy since it is a less cumbersome expression than ft. lb. or B. t. u. per second and is also a concept familiar to engineers. But it should be noted, that from the heat viewpoint, the horsepower of a motor is a very different thing from the horsepower of a brake. The heating of the motor, caused by I^2R loss, friction, etc., has a low value, expressed as horsepower, since it is but a small percentage of the output horsepower. The entire output of the brake, on the other hand, is heat. When expressing the energy dissipated by a brake in terms of horsepower, therefore, it must be remembered that the quantity of heat involved is many times the heat found in a motor of similar horsepower.

It is clear that in braking trains, mechanical energy is transformed into heat at a very rapid rate and that very quickly tremendous quantities of heat are generated. Fortunately, since a brake can be installed at each wheel, this heat does not have to be dissipated in some localized area but instead can be dissipated at each wheel in the train. The problem of heat dissipation is thereby made much easier of solution. In addition, a brake at each wheel makes possible the shortest stop because it enables the maximum retarding force to act upon the train. It is evident that since a brake has to be provided at each wheel, both in order to handle heat satisfactorily and to produce the necessary retardation, the air brake must provide for remote control of all these brakes from the head end.

Car brakes are caused to apply by reducing the pressure in the brake pipe, but this operation should be examined in some detail in order that the reasons for electro-pneumatic control can be better understood. It is a comparatively simple matter to move a car controller from its off to its on position by remote control from the head end, but a somewhat more difficult operation to move a control valve from its release to its applied position, the equivalent of from off to on with the controller. This difficulty arises because the brake pipe is used, not only as the control medium, but also as the means of transporting large quantities of air to the car supply reservoirs, from which the brake cylinders are charged. Because of this function, which means that the feed grooves are open, the control valves, in release position, are not in a condition to respond to slight reductions in brake pipe pressure occurring at a relatively slow rate.

To move the control valves from their off to their on position, it is necessary, therefore, to make a slight reduction in brake pipe pressure throughout the train rather rapidly. This reduction can not be made too rapidly, however, because then an emergency, and not a service application, would develop, not to mention certain other undesirable results. In order that this reduction in pressure may occur quickly throughout the train and with minimum pressure gradient from head to rear, control valves are provided with a quick-service feature which causes the pressure to be vented locally, at each control valve, at the same time that a reduction is being made at the brake valve. With this arrangement, the control valve on the last car of a long train can be moved from its off to its on position in a few seconds. It has been found that the time is roughly proportional to the linear length of the brake pipe; that is, in long trains about one second is required for each 300 ft. of brake pipe. In

* Abstract of a paper presented at the winter convention of the American Institute of Electrical Engineers, held in New York, January 26-30, 1942.

other words, if a train were of such length that the control valve on the last car was 1,000 ft. from the brake valve, this control valve would move from its off to its on position about 3.3 seconds after the brake valve had been placed in service position.

It should be noted that 300 ft. per second applies to the last car only. The combined action of the quick-service feature and the flow of air from the rear is such that the first car does not apply until shortly before the last car. In consequence, at the expiration of a brief interval, proportional to the length of the train, control valves, from head to rear, move from their off to their on positions with a fair approach to simultaneity.

The operation just described covers the movement of the control valves throughout the train from release to application position, in which position the brake cylinders are charged with compressed air from the car reservoirs. In order that the brake cylinders may be charged to full service pressure, the brake-pipe pressure must be reduced, on each car, 24 lb. or, say, from 110 to 86 lb. It is clear that the pressure in a long pipe, commencing at the head end, can not be lowered 24 lb. throughout its length, except that an appreciable time is available, and particularly when the gradient in pressure, from head to rear, must be held to a minimum. With the most modern pneumatic equipment, including continuous quick-service valves, it takes roughly 15 seconds, after placing the brake valve in service position, to build up full service cylinder pressure on the last car of an 18-car train.

The release of the brakes, or the movement of the car control valves back to off position, is accomplished by building up pressure in the brake pipe. After a full service application, as stated above, the brake-pipe pressure throughout the train, is roughly 86 lb. and this pressure must be restored to about 110 lb. before all pressure can be completely released from the brake cylinders. Since the brake pipe-pressure is restored from the head end and against the drain of car reservoirs which are, at this time, recharging themselves from the brake pipe, a substantial time element is involved, although this time is still a matter of seconds and not greatly different from the time to apply all brakes fully.

It is clear that the operations just described involve transient pneumatic phenomena. Electrical engineers appreciate the difficulty attached to understanding and controlling transient electrical phenomena. They probably will not dissent from the statement that transient phenomena in a gas, or elastic medium, present technical problems at least as difficult. Many of these problems can be circumvented by utilizing electrical control means.

Since 1887 at least, it has been understood that the time element involved in applying or releasing brakes could be greatly reduced by the use of electricity and since that time many systems of electro-pneumatic control have been devised and several types have been placed in actual service. The type used on the modern high-speed train may be called a two-pipe system. That is, a second pipe, termed the straight-air pipe, is employed as well as the familiar brake pipe. The straight-air pipe only is used during electro-pneumatic operation.

Each car is equipped with electro-pneumatic valves. When these valves are energized from the head end, pressure is built up locally on each car, in the straight-air pipe, so that the pressure in the straight-air pipe throughout the train can be brought up quickly to full service value. Suitable pneumatic relays, controlled by straight-air pipe pressure, charge the car brake cylinders to the pressure existing in the straight-air pipe and in the same time. With this system of control, full service cylinder pressure can be secured in about four seconds from brake valve movement on all cars of a train of any length. To release the cylinder pressure, the electro-pneumatic valves are de-energized, which vents the straight-air-pipe pressure locally throughout the train. Brake-cylinder pressure is consequently rapidly released.

With this system, it is evident that in service operation, three results, which can not be obtained with pneumatic control alone, are accomplished. First, pressure commences to appear in all brake cylinders throughout a train of any length at substantially the instant the brake valve is placed in service position; second, the cylinders throughout the train can be charged simultaneously to full pressure in a time fixed by the designer's option; third, pressure in the cylinders throughout the train can be completely exhausted simultaneously in a time again fixed by the designer's option.

Importance of a Few Seconds

The time saved by electro-pneumatic control is a matter of seconds. The question arises as to why a few seconds is an item of any great moment in the operation of high-speed main-line trains, which make few stops and few slow downs. If one of these trains, however, traveling at 100 m. p. h., or about 150 ft. per second, has to make an emergency stop to save lives and avoid property damage, the importance of saving a few seconds in brake application time is self-evident.

Fig. 1 illustrates a situation which arises more or less frequently in actual service. A train is moving along

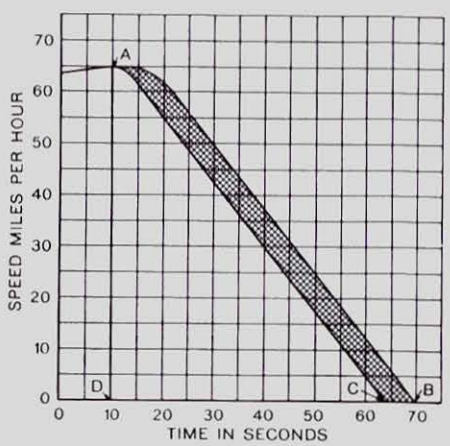


Fig. 1

the track, still accelerating, when it encounters, at *A*, an unfavorable signal aspect and under circumstances which indicate that a service application stop must be made at once. Power is immediately shut off and the brake valve placed in service position. With pneumatic brakes, the train decelerates along the line *AB*; with electro-pneumatic brakes, along the line *AC*. The stop distance with the pneumatic train is represented by the area *ABD*; with the electro-pneumatic train, by the area *ACD*. The cross hatched area is the saving in stop distance, which, obviously, is far from negligible.

This chart has been prepared to show the gain brought about by a single factor, that is, the use of electricity, and does not refer to any specific train. It assumes that a full service application, with either brake, produces a retardation of 1.25 m. p. h. s., and that this retardation is constant, irrespective of speed or temperature. When the brake is partially applied, the retardation is taken as directly proportional to the cylinder pressure. The cylinder pressure build-up is assumed to duplicate labor-

atory tests of an 18-car train. The retardation is supposed to depend entirely upon the car cylinder pressures, that is, the locomotive brake blends harmoniously with either system of car brakes. Internal and wind resistance is neglected.

None of these assumptions correspond precisely to the conditions found in actual operation. Notwithstanding, it is believed that the chart fairly indicates the order of the shortening of service stop distances, on a comparative basis, accomplished by adding electricity to the pneumatic braking system. The saving reduces as the number of cars in the train decreases but never entirely vanishes, because the pneumatic application time is always greater than the electro-pneumatic time, even for a one car train.

Since signal spacing is based upon service stopping distances, the situation described above is of considerable practical importance. On some railroads, such as the New Haven, station stops may be rather close. If, on such a road, the decelerating force were relatively low, the train could not, within the distance, be permitted to attain the maximum speed of which it is capable.

Fig. 2, which is based upon the same assumptions as Fig. 1, illustrates a situation frequently encountered in regular service. The train is proceeding along the track still accelerating. Suddenly a condition arises which may call for a brake application. This condition may be an unfavorable signal indication which is not clearing as expected, an automobile crossing the track, a track repair gang somewhat slow to move, or any unexpected interference, of a temporary nature, which may call for a stop. A brake application is deferred as long as possible but with pneumatic brakes, in order to stop short of the interference, the brake valve has to be placed in service position at *A* and the train decelerates along the line *AB*. To stop at the same point with faster acting electro-pneumatic brakes, the brake valve does not have to be placed in service position until several seconds later or at *C*. The train then decelerates along line *CB*.

At *C*, the temporary interference clears; that is, the signal aspect becomes favorable, the automobile completes its passage across the track, the track gang gets out of the way, etc. The brake valve is, therefore, immediately placed in a position to release the brakes. The train continues to decelerate, of course, until the brakes are completely released, which occurs at *D* with the pneumatic brakes and at *E* with the electro-pneumatic.

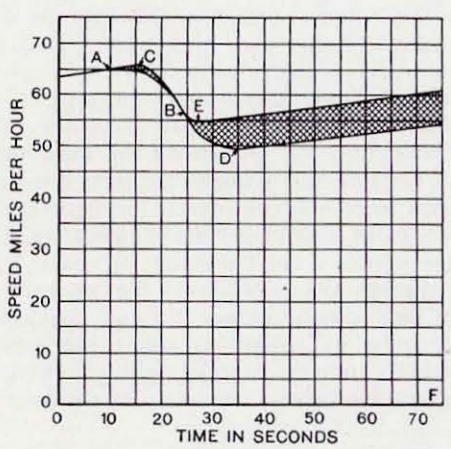


Fig. 2

Power is then applied and the train accelerates. The cross hatched area indicates the greater distance covered by the electro-pneumatic train in the time *OF*. It will be noted also that at *F*, the electro-pneumatic train is at a higher speed than the pneumatic train and is consequently still gaining distance.

It has been stated that in Figs. 1 and 2, it is assumed that a full service application of either the pneumatic or the electro-pneumatic brake produces the same retardation. The savings discussed above are, therefore, those to be credited entirely to the use of electricity. It will be observed that these savings are obtained in situations where the brake valve has to be placed in service or release position without any prior warning. At regular station stops or slow-order curves, the need for a brake application or release can be anticipated, in which event the savings under discussion, with skillful handling, largely disappear. But there are so many occasions in actual operation, apart from emergency stops, when the brake must be applied or released without advance notice that electro-pneumatic brakes contribute materially to the expeditious movement of high-speed trains.

In this connection, the release function is of particular interest. Since a long time and a considerable distance is needed to accelerate a train to the high-speed zone, it is important that the high speed, once attained, be held as long as possible; that is, that slow downs and stops be reduced to the absolute minimum. The urgent necessity of such a course can be readily appreciated by anyone who has noted the effect of one or two stops, or a long detour, on the mileage covered in an all-day automobile trip. The railroads, from the beginning of high-speed operation, have fully appreciated this necessity. Large sums of money have been spent to eliminate speed restrictions at curves, track intersections, grade crossings, etc. Meets have been arranged so that high-speed trains would not be called upon to reduce speed. Steps have even been taken with track repair gangs so that their presence would not interfere with the maintenance of high speed.

That brake release has an effect upon these improvements is not always considered. But it is clear that since slow orders can not be completely eliminated, slow releasing brakes introduce an additional penalty because the speed of the train, due to slow brake release, is brought down somewhat below that called for by the slow order. Electro-pneumatic brakes, because of their fast release, assist greatly in reducing this penalty to a minimum.

That brakes play an important part in maintaining schedule speeds is evidenced by a statement* by A. A. Raymond, superintendent fuel and locomotive performance, New York Central, before the A. S. M. E., namely: "While acceleration only has been shown, getting over the road in the minimum amount of time is affected also by the rate of deceleration, although in general more time is lost accelerating than decelerating."

How the Brakes Work

Fig. 3 shows, in simplified form, the essential elements of the electro-pneumatic system for controlling cylinder pressure. When the brake valve at the left is moved to service position, pressure is built up in chamber *A* of the master controller. This pressure causes shaft *B* to move to the right and close a set of contacts which energize the release wire from the battery. All release magnet valves *R* throughout the train are then energized, thereby closing all exhaust ports from the straight-air pipe. Continued movement of shaft *B* to the right closes the application contacts, which causes all the application magnet valves *A* throughout the train to be energized and opened, thereby permitting air to flow from the auxiliary reservoirs to the straight-air pipe. When

pressure is built up in the straight-air pipe, the relay valves open and from the supply reservoirs, charge the brake cylinders to the pressure existing in the straight-air pipe. Meantime, pressure from the straight-air pipe has been building up in chamber *C* of the master controller. When this pressure almost equals that in chamber *A*, spring *D* moves shaft *B* to the left and opens the application contacts. The application magnets close and the cylinder pressure remains equal to that in chamber *A*.

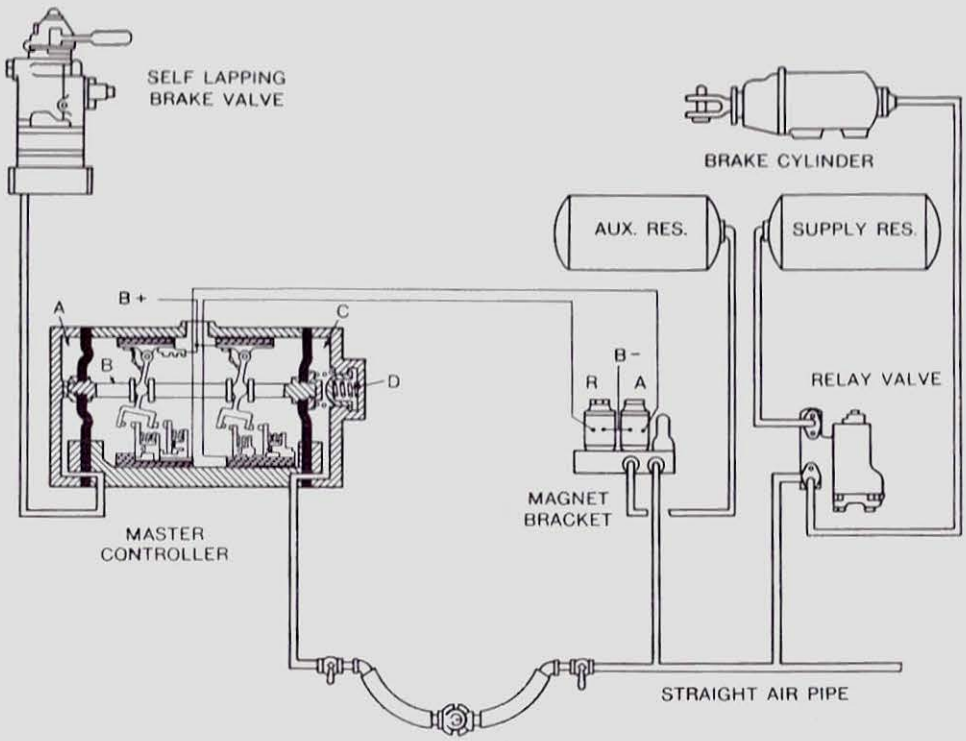


Fig. 3

To release the cylinder pressure, the brake valve is moved to release position which releases the pressure in chamber *A*. Shaft *B* then moves to the left and opens the release contacts. All release magnet valves are then deenergized and straight-air pipe pressure is exhausted to atmosphere at each magnet bracket. Exhausting the straight-air-pipe pressure causes the relay valves to move to a position in which the brake cylinders are connected to atmosphere. The brakes are thereby released.

The very simplicity of this control system tends to obscure the many advantages it possesses. These advantages represent such an advance in the brake art that it is believed attention should be directed to them.

The brake valve employed with this system retains an old name but actually the mode of operation is entirely changed. The self-lapping brake valve is essentially a two-way regulating valve; that is, it regulates the pressure admitted to, or discharged from, chamber *A*. When the brake-valve handle is moved to the right, out of its normal or release position, each position of the handle calls for a definite pressure. In other words, when the handle is placed in a certain position, the pressure in chamber *A* is increased or decreased, depending upon whether it is less or greater than the pressure called for by the position of the brake valve handle. The pressure can be increased or decreased, at will, in very small steps. It is independent of the volume of chamber *A* or the pipe attached thereto and is not affected by any reasonable leakage from volume or pipe.

* See the *Railway Age*, September 20, 1941, page 446.

Those who are acquainted with old-style brake valves will appreciate what an advance in the art this self-lapping brake valve represents.

For practical purposes, the master controller moves to its application position, the application magnet valves are energized and the relay valves are opened coincident with placing the brake valve in an application position. It has been previously explained that several seconds are required to move the control valves of the purely pneumatic system from their off to their on position with trains of customary length. All this time is eliminated by electro-pneumatic control.

Furthermore, the time of charging the brake cylinders to full pressure is not contingent upon dropping the pressure throughout a long brake pipe. Instead, the application magnet valves on each car can charge the small straight-air pipe volume of each car very quickly and the brake-cylinder pressure, through the action of the relay valves, keeps pace therewith. Each application magnet valve is provided with a choke so that the time of fully charging the straight-air pipe is prefixed at about four seconds. It is not necessary to change the size of this choke to compensate for variations in car length, etc., because the straight air pipe itself averages out variations since it is continuous throughout the train. If a magnet valve should become inoperative, this continuous pipe supplies the necessary air from front and rear. If, during an application, the pressure in the straight-air pipe should reduce through leakage, which is probable since its volume is small, the master controller promptly moves to the right, re-energizes the application magnet valves, and restores the loss in pressure.

Electro-pneumatic brakes can be applied to one-half their full service effectiveness in about two seconds. It is clear that if the pressure buildup had to be shut off by moving a brake valve back from service to lap, very considerable skill would be required, if indeed it could be done with reasonable accuracy. With the system

shown in Fig. 3, the brake valve is moved half way toward full service position which produces one-half the full service pressure in chamber *A*. As soon as this pressure is attained in the straight air pipe, and hence the brake cylinder, the master controller de-energizes the application magnet valves. It is plain that this system makes it possible to apply and release brakes partially, despite the very short times involved, easily, positively and uniformly.

With this system, the control of cylinder pressure is not influenced by the number of cars that may be in the train. This is in decided contrast to a purely pneumatic system in which the time to obtain a certain cylinder pressure changes with the number of cars in the train. That brake action should be independent of train length is obviously so desirable as to call for no extended comment.

The action of the relay valve, which directly charges the brake cylinder, is not changed by variable brake-cylinder volume. Variations in brake-cylinder pressure caused by variations in piston travel, a troublesome problem with older pneumatic brakes is entirely overcome. Moreover, the relay valve automatically maintains the brake-cylinder pressure against leakage.

The net result of this control system is that any cylinder pressure desired, requiring either an increase or a decrease over the pressure previously existing, may be easily, positively and uniformly obtained in a very short time which is always the same irrespective of train length; and independent of variations in pipe volumes, changes in brake-cylinder piston travel or brake-cylinder leakage. Similar results, particularly with respect to time, can not be attained with a one-pipe pneumatic system.

Graduating Brake Pressure to Match Train Speed

It is well known that the friction of cast-iron brake shoes, for a given pressure, decreases as the speed increases. If the same retardation is to be obtained in the high-speed brackets as in the low, a greater brake-shoe pressure must be employed at the higher speeds. It has been found empirically that satisfactory results are obtained if 100 per cent of this higher pressure is employed at speeds above 65 m. p. h., 80 per cent between

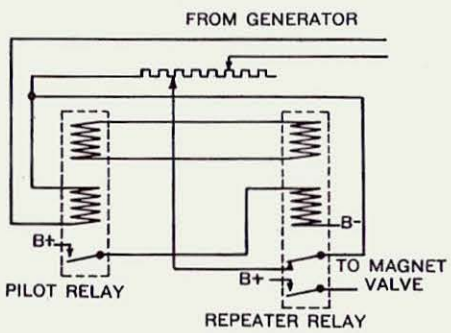


Fig. 4

65 and 40 m. p. h., 60 per cent between 40 and 20 m. p. h., and 40 per cent at speeds below 20 m. p. h. To make these changes automatically, it is evident that a speed-recognizing device is required. For this purpose, a generator, usually axle mounted, is employed.

A generator to measure speed is a familiar arrangement but such generators ordinarily provide energy only sufficient to operate indicating instruments. The generator here considered has to supply enough energy to operate a system of relays, which means that at 100 m. p. h. the generator output is about 6 watts. Since the relays operate on direct current, a d.c. generator is used and operation in either direction is taken care of by a directional relay.

One problem with relays, of course, is that they pull in with one voltage and drop out with an appreciably lower voltage. This characteristic has to be overcome with the speed control system since it is desired that speed recognition be as sharp and definite as possible. The method used is illustrated by Fig. 4.

When the generator has built up sufficient ampere turns in the lower coil of the pilot relay to pull in the armature, the closing of the contacts energizes the lower coil of the repeater relay. The flux thereby built up induces a current in the upper circuit which adds to the ampere turns of the pilot relay, so that its armature is pulled in without hesitation or fluttering. Opening of the upper contacts of the repeater relay cuts additional

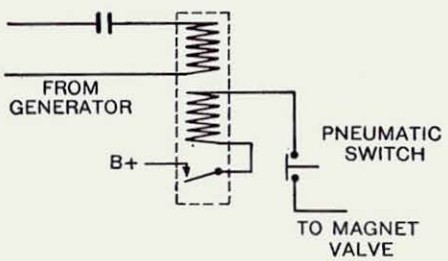


Fig. 5

resistance into the circuit of the lower coil of the pilot valve. It consequently drops out on a higher voltage than would otherwise be the case.

The result achieved with this combination is that if the pilot relay pulls in at a speed of 69 m. p. h., it drops out at no less than 65 m. p. h. and ordinarily at a somewhat higher speed. This 4 m. p. h. maximum range represents a drop of 5.8 per cent. Despite the fact that this device must be sufficiently rugged to withstand the shocks of railway service, its range approaches that of a household thermostat.

Wheel Slide Control

This generator can also be used to prevent wheel sliding. When used for this purpose, the generators are termed Decelostats and one is required per axle.

It is obvious that not very much time is available to prevent wheel sliding. When the wheel is rolling freely with brakes applied, a very small portion of the braking torque is devoted to destroying the angular velocity of the wheel and axle assembly but the greater portion is balanced by the counter torque set up at the rail. But the retarding force set up at the rail cannot exceed the product of the coefficient of adhesion and the pressure actually exerted by the wheel on the rail. If the retarding force is near the adhesion limit, therefore, it is clear that the wheel will slip if (1) the braking torque, for any reason, increases abnormally, (2) the pressure of the wheel on the rail is reduced because of oscillations, etc., or (3) the coefficient of adhesion decreases because a section of bad rail is encountered. If one or more of these conditions arise, the wheel and axle assembly loses angular velocity with great rapidity because the braking torque is directed almost entirely to arresting the rotary motion of the wheel and axle assembly. The wheels may cease revolving completely in a time which may not exceed one second.

A mechanism to prevent wheel sliding, therefore,

must recognize wheel slippage promptly and must act quickly to release brake-cylinder pressure. How this can be accomplished with a generator is illustrated by Fig. 5. The generator charges a condenser through a uni-directional relay. If the wheel is losing angular velocity at an abnormal rate, as it does when the wheel slips, the generator voltage drops at an abnormal rate. The condenser then discharges a current sufficient to trip the sensitive relay, which causes a magnet valve to be energized and pressure to be released very rapidly from the brake cylinder.

It should be pointed out that electro-pneumatic brakes involve control of the brake-cylinder pressure from the brake valve and do not necessarily include speed governor or Decelostat control. That is, speed governors and Decelostats may or may not be used with electro-pneumatic brakes.

Pennsylvania Reports on Its Large 1941 Traffic

THE Pennsylvania, according to its 1941 annual report made public this week, had operating revenues of $614,041,163 last year—an increase of 28.6 per cent over 1940. Operating expenses totaled $442,677,275, an increase of 30.8 per cent. Net railway operating income was $97,102,488, an increase of 12 per cent. Net income totaled $52,383,958, which was an increase of 13 per cent. From this net income, dividends of 4 per cent on stock were paid—leaving a balance of $22,079,080 for transfer to profit and loss.

Both the freight and passenger traffic—as measured in ton-miles and passenger-miles—of the Pennsylvania were greater in 1941 than they were in 1929, the former by 5.9 per cent and the latter by 2.2 per cent. But the average rates were 7.8 per cent lower on freight and 35.2 per cent lower for passengers—with the result that freight revenues were 1.2 per cent less and passenger revenues 31 per cent less than they were in 1929. Mail and express revenue also decreased, the latter especially, so that total operating revenues were 10 per cent under those of 1929.

Revenues and expenses and selected operating statistics, as drawn from the road's annual reports, are given in an accompanying table for the years 1941, 1940, 1932 and 1929. The comparisons for the last-named year with 1941 appear especially significant, as indicating changed conditions in railroading over a 12-year period, because the traffic volume handled in both years was very nearly the same. Attention has already been drawn above to the downward tendency shown in rates—and hence in gross revenues. The expense figures reveal comparisons which, quite likely, are no less significant. Thus maintenance of way expenses were down sharply—a reduction unquestionably reflected in improved methods of doing this work rather than in a reduction in standards. Maintenance of equipment expenses were higher, a situation explicable doubtless by the necessity of reducing the ratio of unserviceable rolling stock in view of present heavy traffic.

The change in taxes speaks for itself—the 1941 total figure including payroll taxes which were not levied in 1929. The Pennsylvania carried its heavier 1941 traffic with almost 18 per cent fewer locomotives and about 5 per cent fewer passenger and freight cars than it had in 1929. Total tractive power of all locomotives was 9 per cent less in 1941 than in 1929 and tonnage capacity of freight cars was about 3 per cent less (although both categories showed considerable increases when 1941 is compared with 1940). Especially remarkable is the contrast in passenger performance. The road carried more passenger-miles in 1941 than it did in 1929, but with a reduction of more than 28 per cent in train-miles, the number of passengers per train rising almost 45 per cent. The freight service operating statistics, for the most part, show similar—if much less spectacular—improvement.

New equipment placed in service during 1941, "to meet the requirements of National Defense," the report

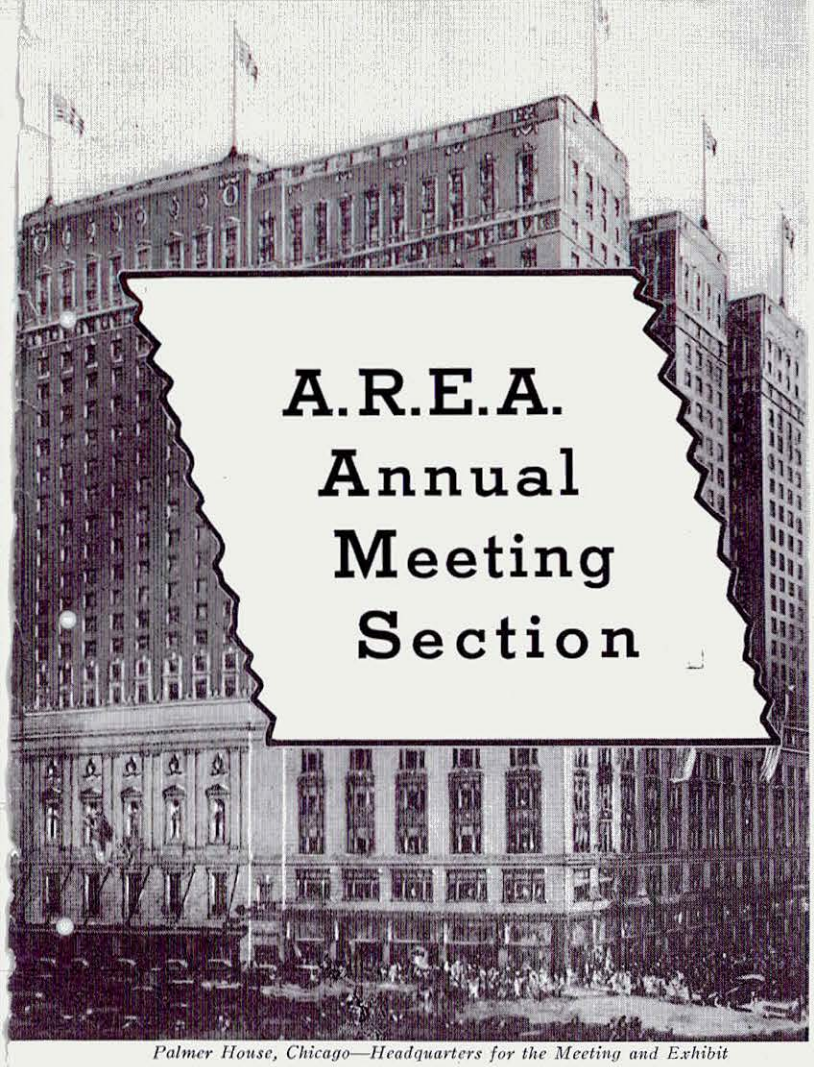
Pennsylvania—Revenues, Expenses and Operating Statistics Compared

	1941	1940	1932	1929
Freight Revenue	$477,008,587	$363,510,306	$235,347,937	$482,896,402
Passenger Revenue ..	89,022,892	71,623,220	59,738,930	129,583,665
Mail Revenue	12,851,459	12,464,150	11,984,991	18,345,259
Express Revenue	5,822,680	6,024,182	5,951,954	16,926,413
Total Oper. Revenue.	614,041,164	477,593,408	331,393,458	682,702,931
M. of W. Expenses..	67,466,477	48,732,989	26,457,504	87,847,375
M. of E. Expenses..	134,901,608	97,757,158	65,274,608	131,642,781
Traffic Expenses	8,984,653	8,771,527	7,228,351	11,054,411
Transp. Expenses ...	214,127,540	168,107,037	122,648,843	235,190,937
Total Oper. Expenses	442,677,275	338,454,678	242,011,603	493,150,592
Net Revenue from Ry. Operation	171,363,888	139,138,730	89,381,855	189,552,339
Railway Taxes	50,086,509	31,437,624	28,231,430	40,518,596
Total Taxes	66,159,548	43,885,188	28,231,430	40,518,596
Equip. & Joint Facility Rents Dr. ...	8,101,852	8,754,056	11,943,160	15,805,391
Net Ry. Oper. Income	97,102,488	86,499,486	49,132,038	133,139,626
Non-Oper. Income ..	41,663,096	41,335,655	46,599,392	48,791,500
Gross Income	138,765,583	127,835,141	95,731,430	181,931,126
Deductions from Gross Income	86,381,625	81,596,891	82,157,894	80,552,608
Net Income	52,383,958	46,238,250	13,573,536	101,378,518
No. of Locomotives..	3,539	3,543	3,890	4,297
Tractive Power, lb...	208,480,569	208,236,679	217,180,342	228,968,712
No. Passenger Train Cars	4,917	4,560	4,965	5,188
Seating Capacity Persons	181,763	182,104	195,526	198,670
No. Freight Cars ...	175,889	173,614	186,324	184,704
Freight Car Capacity Tons	9,708,520	9,530,615	9,984,970	9,982,970
Freight Train-Miles..	46,246,469	36,548,978	29,100,268	48,555,937
Passenger Train-Miles	43,486,984	41,612,666	44,441,211	60,950,657
Yard Switching Loco.-Miles (Frt.)	33,514,262	24,686,430	19,651,852	39,003,714
Road Frt. Loco-Miles	61,454,673	49,052,992	35,844,235	61,255,500
Psgr. Loco.-Miles ...	44,041,144	40,826,053	42,300,459	61,133,005
Ton-Mi. (Rev. Frt.) —(000)	52,096,022	39,755,555	25,225,676	49,174,162
Avg. Tons per Train (Rev. Frt.)	1,152	1,107	853	1,005
Rev. Tons per Loaded Car	29.3	28.9	28.0	30.9
Avg. Haul Mi. (Rev. Frt.)	236.7	228.1	242.4	210.6
Per Cent Loaded to Total Car-Miles ..	62.9	60.5	60.9	63.2
Rev. Passenger-Miles (000)	4,329,901	3,441,635	2,190,742	4,234,748
Rev. Passengers per Train	100	83	49	69
Avg. Rev. Psgr. Trip (Mi.)	58.1	53.6	35.9	37.2
Rev. per Psgr.-Mi. ¢	2.056	2.081	2.729	3.173
Rev. per Ton-Mi. ¢..	.916	.914	.934	.994

states, included 4,954 freight-carrying cars, 200 cabin cars, 3 locomotives, 41 large-capacity tenders, 668 freight containers, 4 passenger coaches, 3 car floats and 1 tug boat. In addition, 110 passenger train cars were remodeled. On order at the close of the year were 6,922 freight-carrying cars, 250 cabin cars, 23 locomotives, 16 large-capacity tenders, 14 passenger coaches, 10 car floats, 15 barges, 10 lighters, 1 tug boat and 1 track sweeper.

In the twelve-year period ended December 31, 1941, the report continues, over 35,000 new freight cars and 336 locomotives were placed in service, and a total of nearly $670,000,000 was expended "for additions and betterments to equipment, roadway, structures and other

(*Continued on page 555*)



A.R.E.A. Annual Meeting Section

Palmer House, Chicago—Headquarters for the Meeting and Exhibit

Containing

The Meeting Program

N. R. A. A. Exhibit Hours

Expenditures for Construction and Maintenance Will Exceed One Billion in 1942

A Revolution—in Railroad Grading Equipment and Methods

Descriptions of New and Improved Products of Manufacturers

A complete report of the annual meeting, including abstracts of the reports and addresses presented at the various sessions and of the comments made in discussion from the floor, will appear in the next, or March 21, A. R. E. A. Convention Proceedings issue of the *Railway Age*.

National Railway Appliances Association Exhibit

Palmer House, Exhibition Hall

Monday,	March 16—9 a. m. to 6:30 p. m.
Tuesday,	March 17—9 a. m. to 7:00 p. m.
Wednesday,	March 18—9 a. m. to 6:30 p. m.
Thursday,	March 19—9 a. m. to 3:00 p. m.

Program

43rd Annual Meeting

Palmer House, Chicago

Tuesday, March 17

Morning Session—9:45 A. M.

Convention called to order
Address by F. L. C. Bond, president
Reports of the Secretary and the Treasurer
Reports of committees on
- Standardization
- Signals and Interlocking
- Electricity
- Waterways and Harbors
- Economics of Railway Location and Operation

Address by Andrew Stevenson, chief of the Transportation and Farm Equipment Branch, War Production Board, on What the Railways May Expect in Maintenance Materials

Afternoon Session—2 P. M.

Address by Joseph B. Eastman, director, Office of Defense Transportation, on What Is Expected of the Railways
Reports of committees on
- Highways
- Co-operative Relations with Universities
- Water Service, Fire Protection and Sanitation

Adjournment at 4:30 p. m. to visit the exhibition of the National Railway Appliances Association in the Exhibition Hall of the Palmer House

Wednesday, March 18

Morning Session—9 A. M.

Reports of committees on
- Economics of Railway Labor
- Maintenance of Way Work Equipment
- Wood Preservation
- Roadway

Association Luncheon, 12 o'clock

Address by Dr. H. J. Cody, M.A., D.D., LL.D., President, University of Toronto

Afternoon Session—2:30 P. M.

Reports of committees on
- Ties
- Track
- Rail

Eighth Progress Report on the Joint Investigation of Fissures in Rails, by Prof. H. F. Moore

Evening Session—8 P. M.

Address by Col. C. M. Turner, general traffic manager of the Associate British and Irish Railways, Inc., on The Experience of the British Railways with Bombing Attacks

Thursday, March 19

Morning Session—9:00 A. M.

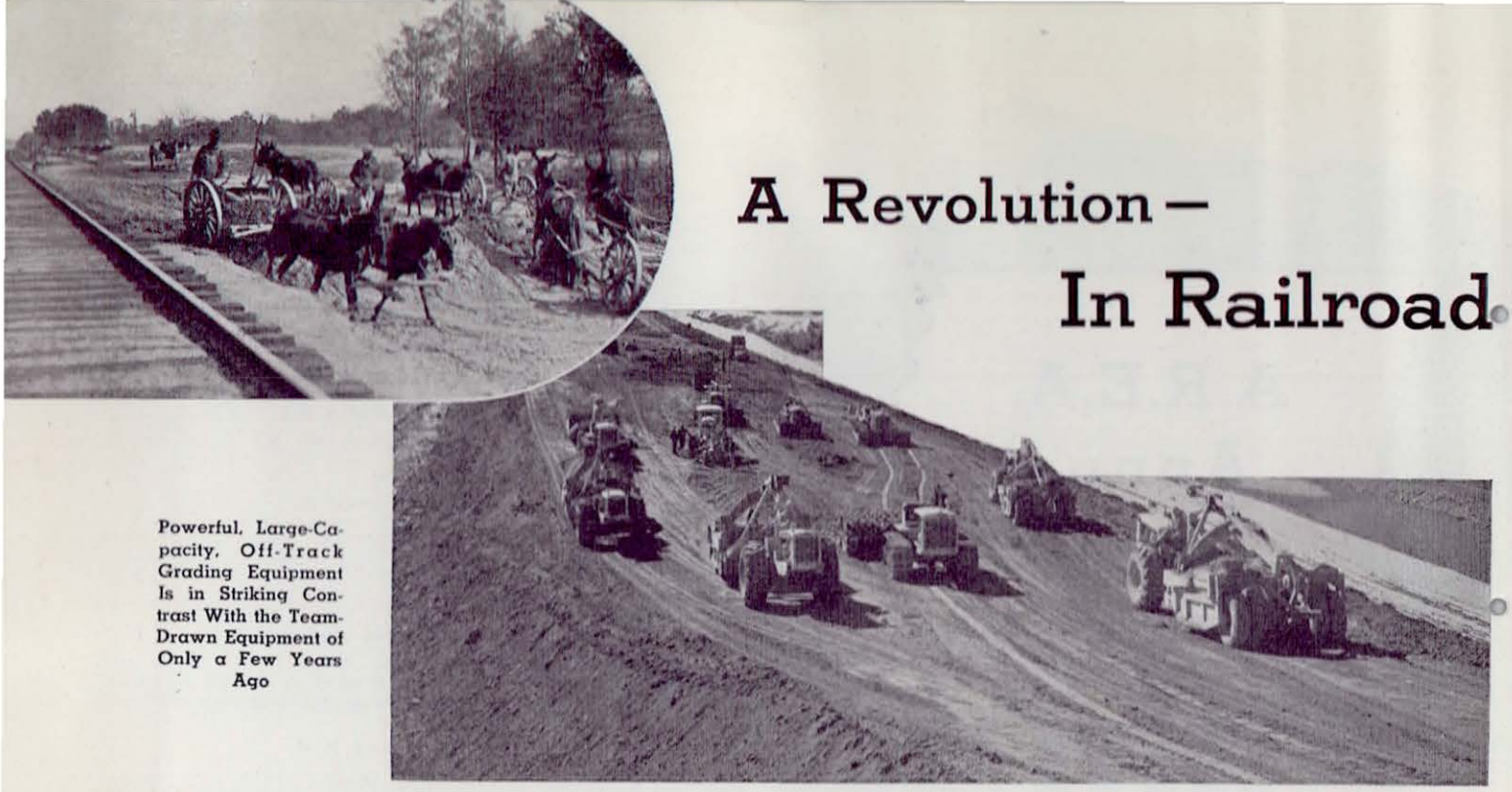
Reports of committees on
- Uniform General Contract Forms
- Buildings
- Yards and Terminals
- Records and Accounts
- Iron and Steel Structures
- Wood Bridges and Trestles

Afternoon Session—2 P. M.

Reports of committees on
- Clearances
- Waterproofing of Railway Structures
- Impact
- Masonry

Closing Business

A Revolution — In Railroad



Powerful, Large-Capacity, Off-Track Grading Equipment Is in Striking Contrast With the Team-Drawn Equipment of Only a Few Years Ago

DURING the last decade, and with increasing momentum each succeeding year, a revolution has been taking place in grading equipment and grading methods, a revolution no less striking than that which has taken place in passenger train equipment and service during the same period, and one that has had, and that promises to continue to have, a profound effect upon railway construction and maintenance practices and economy, if not on railway train operation itself. Gone are the wheelbarrow, the team-drawn slip and one-yard dump-wagon grading methods of earlier days of railway construction, and equally outmoded are many of the "modern" developments in heavy on-track construction and maintenance grading equipment of only a few years ago.

New Equipment for Every Purpose

Today, mechanical horsepower has supplanted animal power and man power; capacities have outstripped the imagination of early railroad builders; speed and flexibility in methods are beyond comparison with those of earlier years; the crawler tread and huge pneumatic-tired wheel have replaced the steel-tired "wagon" wheel and are replacing the restricting railbound wheel; and, withal, the work train for routine grading operations is passing, interference with revenue train service is being cut to a minimum, and unit grading costs are being reduced to a small fraction of what they have been in the past. A list of the more important units of off-track grading equipment available today includes crawler-type tractors; pneumatic-tired hauling units; trucks; trailers; a wide variety of carrying-type scrapers; bulldozers, trailbuilders and scraping blades; elevating graders; rooters, or rippers; scarifiers; sheep's-foot and road rollers; and a wide range of crawler-mounted draglines, shovels and cranes, both as single-purpose units and readily convertible from one to the other.

While these classes of equipment are marked by many units of large horsepower and capacities, in striking contrast with much of the equipment of the early days of railroading, they are far from confined to such units. On the contrary, they include units of a wide variety of types, designs and capacities for carrying out practically every class of grading work on the railways, regardless of scope, character of terrain, length of haul, type of soil, size of cuts and fills, degree of compaction required, and other influencing factors. Largely because of its range of adaptability, coupled with its off-track features and ability to reduce costs, modern grading equipment, far from being an exclusive tool for new line construction, is highly adapted to the larger current problems of plant extension, line refinement and routine maintenance. As such, it is of special interest to railway engineering and maintenance officers at the present time when extensive programs of such work must be undertaken with speed, minimum interference with traffic and maximum economy in the face of the huge part the railroads must play in our war program.

Tractors Led the Way

Modern grading equipment and grading methods had their inception in the development of the first successful crawler-type tractor in 1904, a unit designed initially to meet the immediate needs of delta and valley farmers in California for a hauling unit that would not mire down in soft alluvial soil. With a crude but important beginning, the early tractor was not only the father of modern, off-track grading equipment, but also the parent of the huge and powerful armored tanks used in modern warfare and the equally powerful tractors, numbering into the hundreds of thousands, employed for hauling and numerous other power purposes in farming, lumbering, a wide range of construction operations, and in industry generally.

Possibly no less striking and important than the development of the crawler tractor itself was the development and application to tractors of powerful Diesel engines, beginning in 1931, which not only reduced tractor operating costs sharply, but which afforded a further impetus to their widespread use through their simplicity of operation and maintenance. Available today in capacities ranging from 25 to 132 drawbar horsepower, with both gasoline and Diesel engines built to a precision not exceeded, and in most cases not attained, in even the most costly automobiles, and employing throughout the latest scientific developments in design and in materials, the

Grading Equipment and Methods

Off-track units and modern practices improve quality of work, speed operations, minimize use of cars and locomotives, avoid interference with traffic and reduce costs

modern crawler tractor has a ruggedness, range of usefulness and dependability under adverse conditions that are found in few other inventions of man. With its sure-footed load-spreading treads and low center of gravity, it has few limitations in the way of soil conditions and terrain, and, employed in multiple (with puller and pusher units), its hauling capacity is practically unlimited.

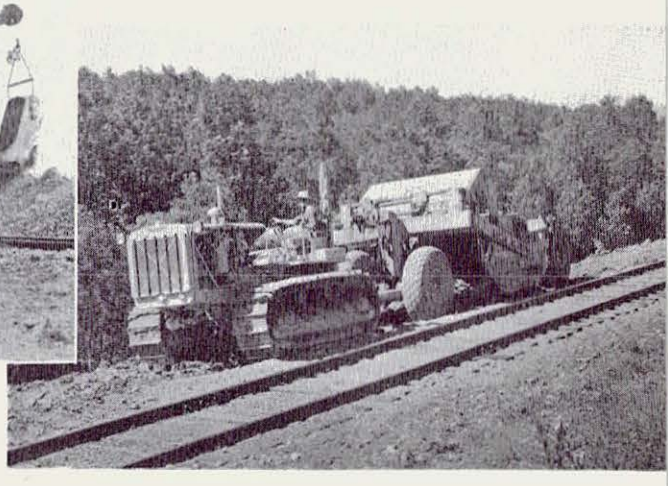
Only in the matter of speed, which in its highest gear is generally limited from five to seven miles per hour, is the tractor at a disadvantage compared with some of the latest types of pneumatic-tired hauling units, now available in a considerable range of capacities, with tire sizes ranging up to 36 in. by 40 in. and 9 ft. 6 in. high from tread to tread, and with loaded operating speeds up to 25 m.p.h. and more. In fact, pneumatic-tired hauling units, with twin Diesel engines, are available with capacities up to 400 hp.

Above — Widening and Strengthening Shoulders With a Heavy-Duty Allis-Chalmers Tractor-Bulldozer Outfit

Above—A ¾-Yd. Crawler-Mounted Dragline, Deep Ditching Along the Main Line of the D. T. & I.

That these powerful and fast units have a definite place in modern grading operations is definitely established. Once put under way with their loads, frequently with the aid of a pusher tractor, they will haul the largest available wheel-mounted earth-moving equipment; have relatively low rolling resistance in soft ground due to the large diameter of their tires; have tremendous compacting power under favorable conditions; and have high efficiency. However, it is recognized that their adaptability to any particular project, and likewise their economy, as compared with the crawler tractor, depend upon many factors, including the magnitude of the project measured in the volume of material to be moved, the length of haul, the class of material to be handled, the character of the dump or roadbed to be moved over, grades to be negotiated, etc. Obviously, these units are best adapted to large projects involving long hauls and generally favorable soil and road conditions.

Below — A Caterpillar — LaPlant-Choate Carrimor Outfit Engaged in Bank-Widening Operations



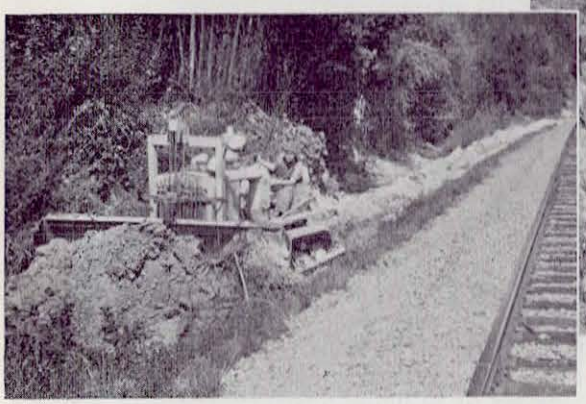
Wide Range of Carrying Scrapers

The developments that have taken place in power units are no more striking than those that have taken place in combination earth-excavating and carrying units, especially the carrying-type of scraper. This type of unit today, in both design and capacity, is a far cry from the scraper of earlier days. Scrapers are now avail-

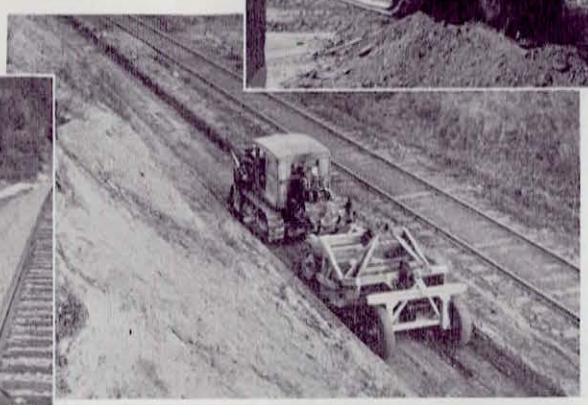
able in a wide range of capacities; are of the self-loading and self-unloading types; are both cable and hydraulically operated; and have fine adjustment, which permits controlled excavation for skimming, routine loading and dressing-up operations. Through equally fine adjustment in unloading, they provide for spreading in thin layers to secure increased compaction, the blending of various classes of filling materials, and improved hauling conditions.

Indicating the wide range and adaptability of this type of equipment for excavating, disposal and filling operations is the fact that it is available in more than 80 models with from two to eight pneumatic-tired wheels and capacities ranging from as little as 3.2 cu. yd. to as much as 60 cu. yd., heaped measure. The smallest of these units has a struck load of 2.6 cu. yd., a cutting blade width of 6 ft., an overall length of 19 ft., an overall width of 6 ft. 11 in., a 12-in. maximum depth of cut and a controlled spread up to 14 in. deep. The largest unit, on the other hand, with a struck capacity of approximately 40 cu. yd., has a 13-ft. cutting blade, an overall length in excess of 50 ft., and an overall width of more than 14 ft.

In between these extremes in scraper capacities are units of at least 12 other capacities, including a widely used 11-cu. yd. unit with a struck capacity of 8.2 cu. yd., a blade length of 8 ft. 6 in., an overall length of 29 ft. 7 in., an overall width of 9 ft. 11 in., a maximum cutting depth of 12 in., and a controlled spreading limit of 20 in. These various units are designed to be hauled by crawler tractors and pneumatic-tired power units, assisted usually in excavating and loading operations, especially in their larger capacities and in heavier classes of excavation, by a pusher tractor, an auxiliary pulling tractor, or both, the auxiliary tractors being employed in plowing, rooting, bulldozing or other classes of work between helper operations.



Below—Ditch Cleaning on the Great Northern With a LeTourneau Bulldozer Outfit



Above—A Tracson Traxcavator in Track Reconstruction on the D. & R. G. W., Handling Dirt and Ballast

Above—A Caterpillar Tractor and LeTourneau Carryall Ditching on the Great Northern

Trucks, Trailers and Wagons

For use with elevating graders, power shovels, cranes and draglines, a wide range of truck, trailer and wagon types of earth-moving equipment is available, equipped both with pneumatic tires and with crawler treads with side, end and bottom dump; and in a wide range of capacities up to and exceeding 16 cu. yd. Depending upon their design, capacities and special features, some of these units are better adapted to specific jobs than others. For example, pneumatic-tired units are generally conceded to be better adapted to long hauls over suitable ground, whereas crawler-mounted units may prove better adapted in unusually soft material because of their larger tread area, with corresponding lower unit pressures.

Similarly, large flared-top wagons, trailers or buggies may simplify and speed up loading where large-capacity draglines or shovels are used, and, to an important extent, a specific type of dumping arrangement may be more advantageous than another where controlled spreading is an important factor as compared with routine wasting operations. However, here again, the most suitable type of equipment depends upon a variety of conditions, conditions which must be viewed usually in the light of general and long-time use on a wide variety of jobs, rather than on any specific job, unless of exceptional magnitude.

Bulldozers and Trailbuilders

Equally as important in modern grading operations as the foregoing units of equipment are the bulldozer and trailbuilder (angledozer) units, which, while far from of recent developments, have, with the increasing power available in crawler tractors, been increased in size and usefulness far beyond that of the light blades of earlier years. Today, bulldozers, with cable or hydraulic control, are available with moldboards (blades) ranging in lengths from 5 ft. 7 in. to 11 ft. 3½ in., and in heights from 20½ in. to 47½ in. They are also available with lifts up to 57 in. for spreading and embankment work, and a drop below the ground level of as much as 72 in. in certain models for breaking down ground in front of them. In addition, bulldozers are available with a lateral blade tilt arrangement, making it possible to lower one corner or the other for digging operations, and some of the blades are fitted with replaceable cutting tips of specially treated steel.

Trailbuilders, like bulldozers, are available with both cable and hydraulic control and in a wide range of sizes. Lengths of blades range from 7 ft. 1 in. up to 13 ft. 7 in., and heights from 18 in. to 44 in. The different models have lifts up to 54 in. and can be dropped below the ground level as much as 52 in. Generally, the trailbuilder

blade is fixed at an angle to the right or left, usually from 55 to 67 deg., and, like certain of the bulldozer blades, it is available with the lateral tilt arrangement for digging operations. In addition, some of the blades are reversible, and, like some of the bulldozer blades, are fitted with replaceable tips of specially hardened steel.

Above—An Athey MobiLoader Cleaning Out a Long, Slide-Filled Cut Ditch on the D. & R. G. W.

Above—Grading on the Northern Pacific With a Cletrac Diesel—Heil Cable Scoop Outfit

Still two other and more recent developments in equipment for a wide variety of ditching, grading and material-handling work are the front-end loader and the overhead loader, both tractor attachments, with buckets of various capacities up to 9 cu. yd. These units can excavate in even the hardest ground, carry their loads to points of disposal, or load directly into trucks or cars.

While these units have special features inherent in their designs, the primary difference between them is that one discharges its load at the front, to heights limited to about 10 ft., while the other throws its load overhead to a chute or apron at the rear. Both of these units are fast, can work within relatively confined areas, have unlimited swing, and can carry their loads for considerable distances economically where it is not feasible

Below — Earth-Leveling Operations With an International TD-18 Diesel Tractor and Bulldozer

The rooter, or ripper, one of the newer tools developed for use with the tractor, has quickly found its place in a wide range of grading work. Available with one, two or three rooting standards, and in triple-standard models from which one or two of the standards can be readily removed to best meet ground conditions, these units, pulled by one or more tractors, can break up and frequently shatter hardpan, shale, limestone, frozen ground, and even some classes of paving. Being readily coupled to and uncoupled from the rear of tractors, the tractors employed in pulling rooters can be equipped with bulldozers, trailbuilders or other front-end equipment and used for a wide range of other operations when not engaged in rooting. In many cases, tractors equipped with special pusher dozer plates or other attachments to assist in scraper-loading operations, do all of the rooting work when not otherwise engaged, neither attachment interfering in any way with the other.

Through the use of the rooter where conditions warrant, the speed of loading scrapers is greatly increased, increasing the yardage that can be moved per hour, and thus reducing unit costs. Under other and more difficult excavating conditions, rooter operation will minimize or offset entirely blasting operations and the expense of moving in shovels and trucks for loading and disposal.

Much Other Equipment

Other units figuring prominenty in the list of modern grading equipment include sheep's-foot rollers, truck tanks and sprinklers, harrows, rock and brush rakes, tree-dozers, brush and root cutters, stump splitters, elevating graders and a variety of road graders for trimming side slopes, ditches and flat or crowned surfaces. to employ trucks or other hauling equipment in conjunction with them.

Adding to the equipment already mentioned, and essential for many classes of grading and excavating operations, are crawler-mounted shovels, draglines and cranes, and, more especially for many classes of routine roadway maintenance work, highly flexible and versatile convertible crawler-mounted shovel-dragline-cranes, both gasoline engine and Diesel powered, which are now available in capacities ranging from ⅜ cu. yd. to 2½ cu. yd. or more. These units, incorporating the long experience of manufacturers in building larger and heavier on-track units in the past, units that are by no means outmoded for many classes of heavy excavation work, are fast, powerful, full-revolving, of rugged construction, highly mobile and stable, and readily convertible from one type to another.

Furthermore, being light, these units exert relatively low ground pressures, making them suitable for working in soft ground, and through this same feature, plus their own power, they are readily self-loading and self-unloading when transported from job to job on flat cars, or on pneumatic-tired trailers operated over the highways. In addition, some of the convertible units can be equipped with a trench hoe boom and dipper arm, pile driver leads and other attachments, adapting them to a wide range of special jobs.

New Conception in Grading Requirements

As regards most of the units of off-track grading equipment available today, and especially those units of larger capacity, it must be recognized that grading contractors and equipment manufacturers have shown the way. No less true, however, is the fact that these de-

velopments have been stimulated to a large extent by the more stringent specifications for speed, greater compaction and lower unit costs set up by the U. S. Army Engineering Corp., the Federal Bureau of Reclamation, the various federal and state highway departments and the railroads involved in huge dam, levee, highway and line relocation projects in recent years. Largely under the guidance of these agencies, an entirely new conception in grading methods has come about.

Gone are the days of trestle-dumped, uncompacted fills, where subsidence of 10 to 15 per cent could be expected during the seasoning period under train operation, with the seriously restricting slow orders and huge track maintenance costs that were involved. Gone are the days of tediously slow team operations, hampered by inclement weather in the summer and frequently shut down in the winter. And gone also are the far larger interest charges during construction through the completion of projects in from one-half to one-tenth the time required formerly. Modern grading calls for speed and minimum costs, combined with stringent requirements for water-tight, impervious, non-subsiding fills, and stable, quick-draining cuts—and nowhere outside of earth dam construction are these factors more important than in railroad roadbed construction and maintenance.

Modern Methods on Shasta Line Change

That modern grading methods have found their way into large-scale railroad line construction is evidenced in practically every outstanding line relocation project of recent years. On the 30.1-mile line relocation of the Southern Pacific around the Shasta Dam project of the federal government in northern California, for example, now nearing completion, the highest standards of construction, coupled with modern grading methods, were employed. On this project, which has been carried out under the direction of the United States Bureau of Reclamation of the Department of the Interior, and which has involved more than five and one-half million cubic yards of excavation in cut and fill construction in a rough mountainous territory, the science of soil mechanics, combined with the use of modern grading equipment, has been employed to the fullest extent to produce compact, water-tight, non-subsiding fills and free-draining stable cuts.

Throughout the grading operations on this project, which were carried out under contract in five major sections, the equipment employed included as many as 20 to 25 carrying-type scrapers of 18 to 32 yd. capacity, 20 to 25 crawler-type tractors up to 95 hp., 15 bulldozer-equipped tractors, 8 heavy-duty rooters, several tractor-mounted rock racks, 6 sheep's-foot rollers, 5 or 6 water-tank sprinklers, one 2½-yd. and one 2-yd. shovel, one 2½-yd. dragline, and one 2½-yd. convertible shovel-dragline-crane. That with this equipment rapid progress was made throughout the grading work is seen by the fact that as much as 526,000 cu. yd. of material was moved during peak months.

Unquestionably, the scientific soil studies that were made on this project, both prior to and during grading operations, were the most extensive and detailed ever carried out in connection with railroad line construction to that time. These studies were predicated upon the knowledge that, regardless of the character of the soil involved, the compacted soil that contains the least voids is necessarily the most water-tight and will soften less under water absorption. They were also predicated on the knowledge that the degree of soil density required can be obtained by controlling the design and routing of grading and compacting equipment and by placing the correct moisture content in the filling material, with relation to the particular grading equipment employed, before it is compacted.*

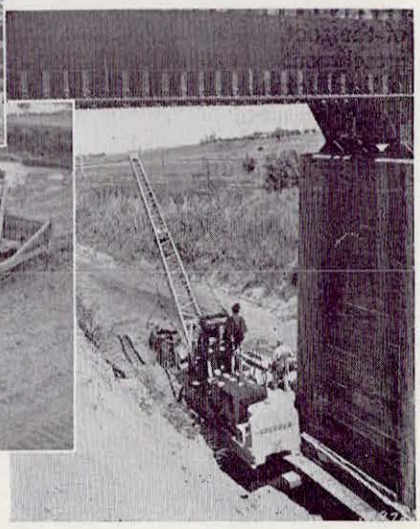
Santa Fe Reservoir Line Change

Another outstanding example of modern grading methods in railroad line construction is that in connection with the 20-mile single-track main-line line change on the Atchison, Topeka & Santa Fe around the John Martin reservoir site in Colorado, completed recently under the direction of the U. S. Army Engineering Corps where, employing pre-wetting of the soil placed in embankments and the latest types of hauling and compacting equipment, fills were constructed with a density and

* A detailed description of the grading methods employed on this project appeared in the *Railway Age* of June 21, 1941, page 1108.

Below — A 96-HP. LeTourneau Tournapull and Large-Capacity Tournatrailer. Right — Trestle-Filling With a Battery of Tractors and Carrying-Type Scrapers

Below—A Link-Belt Speeder Convertible Tractor Crane Engaged in Bridge Foundation Work on the Burlington. Below Left—A Three-Drum Sheep's-Foot Roller



water tightness not exceeded in the most modern earth dams. On this project, which involved a total of 3,150,000 cu. yd. of grading in heavy dune sand with patches of a mixture of sand and clay, loess, soft shales and rock, the grading was done essentially by two outfits, one called a tractor-scraper outfit, and the other a wheeler outfit, the latter from the fact that the scrapers employed were hauled largely by pneumatic-tired power units.

The former of these outfits, which was employed principally in constructing the shallower fills, up to a maximum height of approximately 25 ft., and where the haul was limited to approximately 1,000 ft., included 12 113-hp. hauling tractors, some equipped with push fronts or bulldozers; 10 13-yd. hauling scrapers; 7 7-yd. trucks; 2 sheep's-foot rollers and 1-motor patrol-type blading grader. The wheeler outfit, on the other hand, with generally greater hauling speed, and, therefore, used primarily where high lifts and hauls in excess of 1,000 ft. were involved, included 12 7-yd. wheeler outfits, with a loaded speed of 18 m. p. h. and an empty speed of 20 to 22 m. p. h., 5 113-hp. crawler tractors equipped with push fronts or bulldozers; 2 motor patrol-type blading graders; and 2 sheep's-foot rollers. This equipment of the two outfits was supplemented by two 2,000-gal. water tank sprinklers, hauled by wheeled tractors, and two 1,200-gal. water trucks, employed in the embankment-wetting operations.

With these two grading outfits, working for the most part for three shifts each day and employing 12 twin-projector portable electric floodlighting plants for night illumination, an average of 25,000 cu. yd. of material was moved each 24-hr. period during the major part of the work, reaching a maximum of approximately 35,000 cu. yd. during a number of such periods.†

Equally Adapted to Maintenance Grading

And so the record goes for one large project after another, for hundreds of smaller similar projects, and for a multitude of routine roadway ditching and grading operations, under contract and with company forces and company-owned equipment. In fact, in the aggregate, the hundreds of smaller grading projects and routine roadway maintenance operations carried out by company forces far outstripped in magnitude the relatively few larger projects undertaken each year in major line changes or extension. And as there is greater appreciation of the adaptability of present-day off-track grading equipment to these smaller operations, and of the fact that this equipment can be operated by company forces equally as well as by contract forces, on even sizable earth-moving projects, the railways are turning to this equipment on an increasing scale.

Prior to 1937, the railroads had little of this type of equipment, but since that time they have purchased it in considerable volume, including 137 crawler-type tractors, 58 bulldozers, 40 trailbuilders, 17 front-end and overhead loaders, 28 carrying scrapers, 5 rooters, 4 road rollers, several road graders, 50 crawler-type draglines, 54 crawler-mounted power shovels and 32 crawler-mounted convertible dragline-shovel-cranes—a total of more than 425 units. And the indications are that with current net operating income the highest since 1929, constantly increasing demands for enlarged and extended facilities to meet the needs of the country's armed forces and war industries, and the necessity for higher standards of track maintenance in every detail to meet the requirements of increased speed with maximum safety, work programs will reach a new peak during 1942, and work equipment purchases will be limited principally by inability to obtain the equipment.

Several Roads Lead the Way

While a number of roads have already turned to modern off-track grading equipment and will confine their purchases largely to this type of equipment in the future, a few roads, including the Denver & Rio Grande Western, the Great Northern, the Southern, the Southern Pacific, the Illinois Central and several others, have shown the way and are today making extensive and effective use of such equipment. These roads have employed this equipment for practically the entire range of construction and maintenance operations, including fill and cut construction in connection with line and alinement changes and yard and passing track extensions, embankment strengthening, ditching on and off the right of way, general right-of-way sloping to improve drainage and to reduce the costs of mowing, clearing stream channels and effecting channel changes, filling bridge openings, clearing up slides, filling in washouts, cutting down obstructions to view at grade crossings, trenching, opening up cuts and removing obstructions to overcome drifting snow conditions, plowing and removing snow around yards and terminals, cleaning up after derailments, loading and unloading materials, and numerous other operations of a less definite character.

How Units Are Used in Maintenance

With versatility and adaptability to a wide range of operations among the outstanding features of present-day off-track grading equipment, a detailed discussion of the various uses of each type of equipment in routine railroad work is impossible within the confines of this article. However, it may be said that, as a general rule, the bulldozers, trailbuilders and draglines are being used to the greatest extent in bank widening—the bulldozers and trail-builders being used to widen banks up to five to eight feet high, pushing material up from side borrow or placing material brought in by trucks or carrying scrapers. Draglines, on the other hand, are being used generally for widening the higher fills, working from the top or bottom, and sometimes from mid-height as well, as conditions may dictate. Draglines are also being used extensively for ditching, cut widening, channel changes and channel clearing work, while the front-end and overhead loaders are being used to large advantage in routine ditch cleaning and restoration work, yard clean-up operations and snow removal, disposing of the material themselves or loading it out into carrying units of one type or another as seems most feasible.

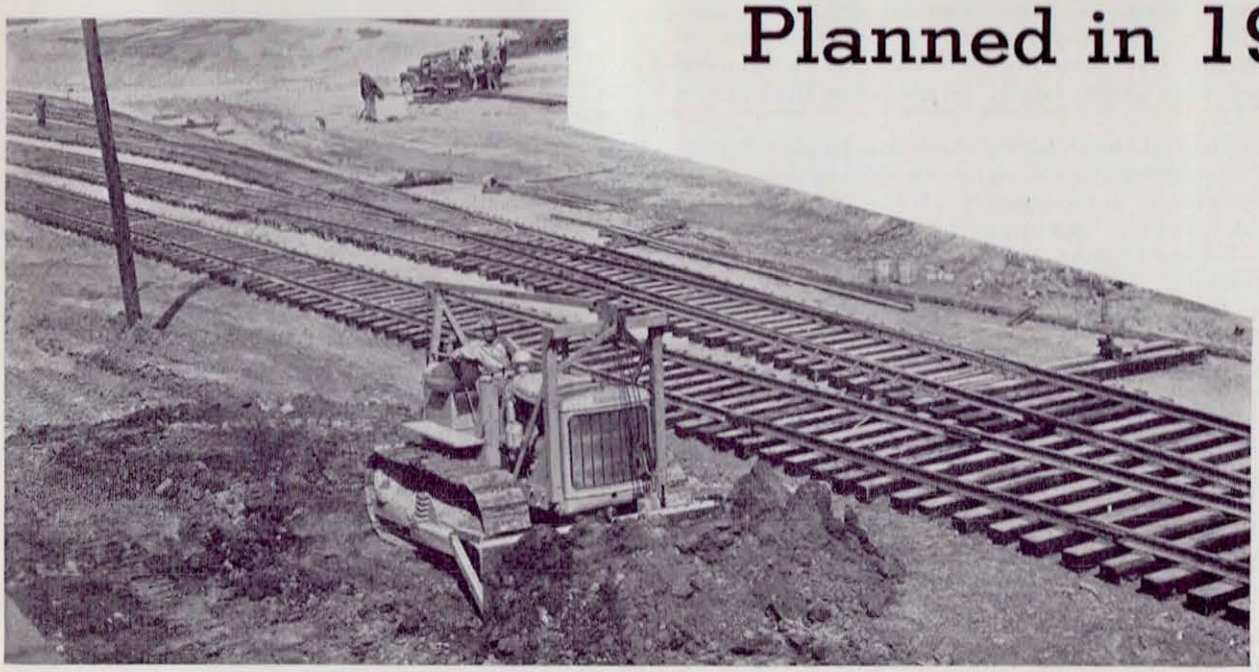
The carrying-type scrapers, along with bulldozers and trail-builders, are finding extensive use wherever sizable yardages are to be excavated, moved, placed and dressed, including line-change, curve-reduction and bridge-filling projects. These units have also proved highly effective in general right-of-way grading, such as re-sloping to improve drainage, and leveling-up operations to eliminate water pockets, prevent snow drifts, improve vision and simplify mowing with off-track power mowers.

Power shovels, accompanied by trucks, find their largest field in roadway maintenance in off-right-of-way borrow pits or banks for roadbed strengthening, and usually where hauls of considerable length are involved. However, this type of equipment is equally effective and

(*Continued on page 556*)

† For a detailed description of the grading methods employed on this project, see the issue of the *Railway Age* for December 20, 1941, page 1040.

Expenditures for Construction Planned in 1942



Additions to Yards and Sidings Are Important Items in the Budgets for 1942

Programs for year include increases in all items, to insure dependable and expeditious handling of traffic in meeting military requirements

WITH traffic already at the highest level in history, with all indications pointing to still further increases of 10 to 15 per cent in car loadings in the months ahead and with the recent rate increase, the railways are planning for the most active year since 1930 in both construction and maintenance. Never before have they been called upon to handle so large a volume of traffic, and never before has so much depended on their ability to move it reliably and expeditiously. With construction held to the minimum for more than a decade, there is now a pent-up demand for new facilities and for the expansion of others that must be met by larger construction programs than any that have been carried out during the last 12 years. So necessary are these improvements to provide for reliable and expeditious movement of traffic and to insure that sudden calls for unusual effort in emergencies will not find the railways wanting, and so clearly is this need recognized by the railways themselves that they plan to spend approximately $400,000,000 for the improvement of their fixed properties during 1942, and $700,000,000 for their maintenance, a total of $1,100,000,000.

This forecast is based on information given us by the engineering officers of a selected group of typical roads concerning their plans for the current year with respect to both construction and maintenance. It is confirmed, in part at least, by the fact that the budgets for 1942 contain almost as many units of work equipment as were purchased in 1941, a year in which an outstanding record was made in the number of units purchased. Obviously, these plans for so many additional power machines and tools immediately following the year of largest purchases, give strong confirmation to other evidence that these officers are planning to increase their activities over those of 1941.

Many Large Projects Included

Further confirmation of this increased activity is to be found in the fact that both the construction and maintenance budgets of the railways as a whole are materially larger than they were last year, a year in which there was a marked upsurge in the amount of money spent for both improvements and maintenance. One of the striking features of the construction plans for 1942 is the number of large projects included in the budgets, this being a continuation of the trend that first manifested itself last year.

Inquiries to determine what construction will be undertaken in 1942 elicited replies from chief engineers and engineers maintenance of way of 40 roads having a total line mileage of 179,000. Of these, 18, representing 30 per cent of the railway mileage of the country, gave details of their proposed expenditures; 3 reported that they do not prepare budgets, but implied that they expected to do a substantial amount of work during the year; 2 said that their plans call for about the same amount of work as was done last year; 6 roads are not planning any important work, but several of this group indicated that the number of minor projects they expect to complete during the year will aggregate a substantial sum; 2 reported that no improvement work will be undertaken during the year, one of these explaining that probable difficulties in obtaining materials had influenced this

and Maintenance Will Exceed One Billion

The railways plan to make still further increases in their expenditures for both construction and maintenance in 1942, exceeding those of last year by $200,000,000, although these expenditures for both construction and maintenance in 1941 were the highest in any year for more than a decade. More large construction projects have already been authorized than in any recent year and others are under consideration. In construction, the aggregate expenditures, including numerous projects of less magnitude, will rise to $400,000,000. This compares with $300,000,000 (estimated) in 1941 and with $444,339,000 in 1930.

In maintenance, the increase over 1941 is also expected to approximate $100,000,000, bringing the total for the year to $700,000,000 or substantially the same as in 1930, a figure that has not even been approached since that year. These expenditures will include appreciable increases in all of the items that enter into maintenance of roadway and structures, with special emphasis on rail, ties, ballasting, roadbed maintenance, bridges and buildings. Details of these expanded programs for 1942 are presented in this article, which is based on information given us by ranking engineering officers of 40 roads.

decision; on 2 roads the budgets have not been approved; and 7 officers believed that it would be unwise to disclose their programs in view of the fact that we are now engaged in war.

Related to Military Needs

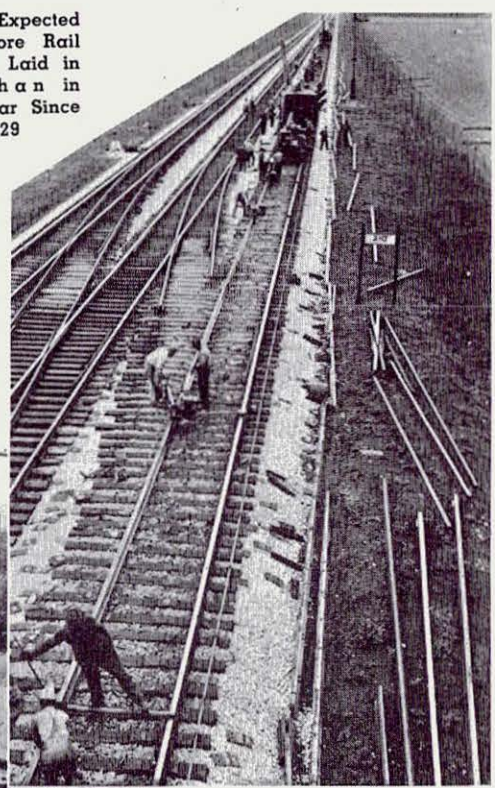
With few exceptions, the budgets cover work related to military needs, and they are planned primarily to expedite the movement of trains and the distribution of cars, to improve the handling of locomotives at terminals and to facilitate repairs to locomotives and cars.

Among the important items included in the budgets are new and improved engine terminals; new, expanded and revised yards, including car retarders; additional industrial tracks to serve factories engaged in war production; increased locomotive-shop and car-repair facilities; additional and enlarged water and fuel stations; and the installation, extension and revision of fire lines at engine terminals, shops, piers and warehouses, to protect these facilities in case of emergencies.

Several roads, some of which have said heretofore that they had no deferred maintenance, plan to strengthen a number of bridges upon which speed and load restrictions have been placed, for the purpose of removing these restrictions so as not to interfere with or delay military traffic. Others plan to retire certain steel bridges that are below present standards and a number of trestles that have reached the ends of their service lives, substituting culverts for the present openings, partly with the idea that this action will require the minimum use of essential war materials.

Passing Sidings to Get Attention

One of the interesting features of the current budgets is that almost all of the replies indicated that considerable attention will be given to the extension, construction and rearrangement of passing sidings during the



It Is Expected That More Rail Will Be Laid in 1942 Than in Any Year Since 1929

An Unusually Large Mileage of Track Will Be Surfaced This Year, Increasing the Ballast to Be Applied by 2,500,000 Cu. Yd.

year. Some officers said that many of the sidings on their roads are not long enough to accommodate tonnage trains and must be lengthened. Others said that with the present volume of traffic the number of trains has increased to the point where there are not enough passing sidings, while in not a few cases the principal trouble under present methods of operation is improper spacing, so that a general rearrangement as well as longer sidings is a crying need. In this connection, a surprisingly large number of the budgets called for one or more installations of centralized traffic control, including remote-controlled switches and, incidentally, the revision of passing sidings.

Three line changes and two grade revisions are included in the budgets, the former presumably to remove speed restrictions and the latter to facilitate the operation of freight trains. In this connection, several roads indicated that they expect to improve their roadbeds, involving bank widening and drainage projects on a scale that removes this work from the category of maintenance and places it in additions and betterments with charges to capital.

New buildings included in the budgets for 1942 are mainly enginehouses and shops and extensions to existing facilities of these types, and those incidental to the improvement of water and fuel stations, of which there will be a large number. On the other hand, many shops, enginehouses, storehouses, office and other buildings are scheduled for modernization without enlargement. The plans for modernization also include a considerable number of passenger stations, especially at important points where present facilities are proving inadequate to handle the sharp upturn in passenger traffic.

Considerable Signaling Will Be Required

To maintain signaling facilities in condition for efficient and safe train operation, a considerable quantity of repair parts, as well as insulated wires and cables, will be required. Several large centralized traffic control projects on different roads, which were started in 1941, are being pushed to completion and others are projected. On at least three extended sections of single track, where the war has caused a large increase in traffic, centralized traffic control is to be installed in 1942 as the quickest means for securing increased track capacity. These projects are considered military necessities, as a part of the war program, and, therefore, the materials are to be supplied on this basis.

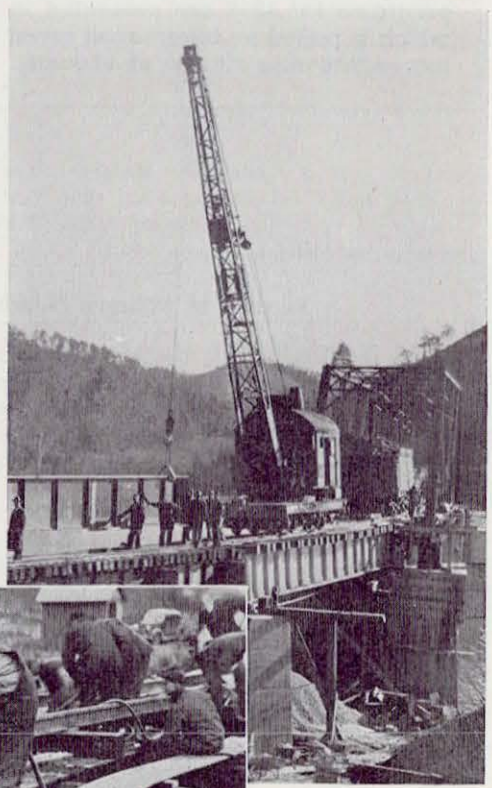
Likewise, priorities are to be given materials for highway crossing signal projects to be installed at crossings in the vicinity of large defense factories as well as military training camps. Considered as a whole, therefore, the volume of signal construction which is authorized and is to be installed in 1942, will represent a surprisingly large total.

It is characteristic of the budgets for this year that most of the projects that have been included can be completed during the year, although those that have been mentioned will, in general, range in cost from $100,000 to $1,500,000 each. On the other hand, there will be an unusually large number of construction projects of less magnitude but of equal importance, most of which are fully as essential to dependable operation as the larger and more spectacular ones. In fact, the aggregate cost of these smaller projects will be greater than the total of the larger but less numerous ones.

Maintenance to Increase $100,000,000

That there will be a comparable increase in maintenance activities during 1942, is indicated by information given us by the same 40 roads, from which information was obtained concerning their improvement programs. In this case, however, 27 roads, representing 40 per cent of the mileage of the United States, and 1 road in Canada, gave details of their maintenance programs. None of the officers in this group expects to spend less in 1942 than he did in 1941, while all but a few will spend from 10 to 40 per cent more than they did last year. On the basis of the budgets of these roads, it is estimated that all of the railways will spend more than $700,000,000 for maintenance in 1942. This is $100,000,000 more than the $603,110,965 in 1941 and is approximately the same as was spent in 1930, a figure that has not even been approached in any intervening year.

As might be expected, in view of the increasing traffic,



Relatively Few Steel Bridges Will Be Renewed This Year, but Maintenance Activities Will Be Increased

More Bridges Will Be Strengthened in 1942 to Remove Slow Orders and Load Restrictions Than for Many Years

the continuation of high-speed train operation and the deficits in new rail during the depression years, rail will constitute a major item in the maintenance programs of all of the roads that gave information on this subject, although several of them expect to lay considerably less than they did in 1941. In fact, several roads that were able to obtain deliveries anticipated their 1942 requirements to some extent by laying part of their rail for this year in the later months of 1941. Despite this, however, the overall requirements for the year, amounting to 1,600,000 tons, represent an increase of one-third over the amount laid last year, and will be the largest amount laid in any year since 1929.

All Classes of Maintenance Will Be Increased

Co-ordinated with this large rail program, the maintenance budgets include larger sums for applying ballast, for strengthening the roadbed, for surface ditching and subsurface drainage and for roadbed stabilization, these grading and drainage items being in addition to the capital sums that will be spent for bank widening and drainage. There will be a large increase in the amount of track surfaced, other than where new rail is laid. This larger mileage of ballasting and other surfacing will call for an increase in the number of ties inserted. There will be more weed destruction by both cutting and chemical methods.

While the replacement of steel bridges will be considerably less than normal because of the restrictions placed on civilian uses of steel, more than the normal amount of maintenance and routine strengthening of these structures will be carried out, in addition to numerous jobs that will require capital expenditures. Almost every officer who gave details of his maintenance program, and others who listed the classes of work to which they expect to give particular attention, emphasized the need for increased maintenance of water and fuel stations, including the facilities for water softening.

2,500,000 Cu. Yd. More Ballast

Paralleling the increase in the amount of rail to be laid, surfacing with or without the application of ballast also constitutes a major item in the maintenance programs for the year. Ballast will be applied not only to the new and relaid rail, but also to many miles of track upon which no rail is to be laid this year. As one engineer maintenance of way put it, "we have been surfacing and resurfacing much of our track without applying ballast for so long that now, in view of the increased tonnage we are handling, we are forced to do a great deal of general surfacing on new ballast to keep our tracks in satisfactory running condition and to avoid damage to the rail."

Increases in the yardage of ballast to be applied, as given in the budgets, range from 10 per cent to 10 times, or 1,000 per cent, the amount used in 1941. However, a few roads that plan to lay less rail this year will also supply less ballast, while a few others will apply approximately the same amount. Taking the roads as a whole, the indicated increase amounts to 2,500,000 cu. yd., compared with the amount applied in 1941, which was 1,000,000,000 cu. yd. more than was applied in the previous year. As a further confirmation of the amount of track to be surfaced, the budgets also provide for the purchase of 300 tie-tamping outfits, complete with power plants and tools, and 967 self-contained tie tampers, the largest number ever to be purchased in a single year.

Today no maintenance officer would apply ballast on a roadbed less than full section, or without providing for drainage where necessary to insure stable support for the newly-surfaced track. For this reason it is logical to assume that the increased amount of ballast that will be applied will be accompanied by a corresponding increase in roadbed widening, surface ditching, subsurface drainage and the cleaning out of troublesome cuts. Confirmation of this assumption is given in direct statements by some of the roads that such is their plan, while other evidence that there will be a marked increase in these classes of work is found in the budget provisions for the purchase of 150 units of ditching and other earth-moving equipment this year.

Will Need More Ties

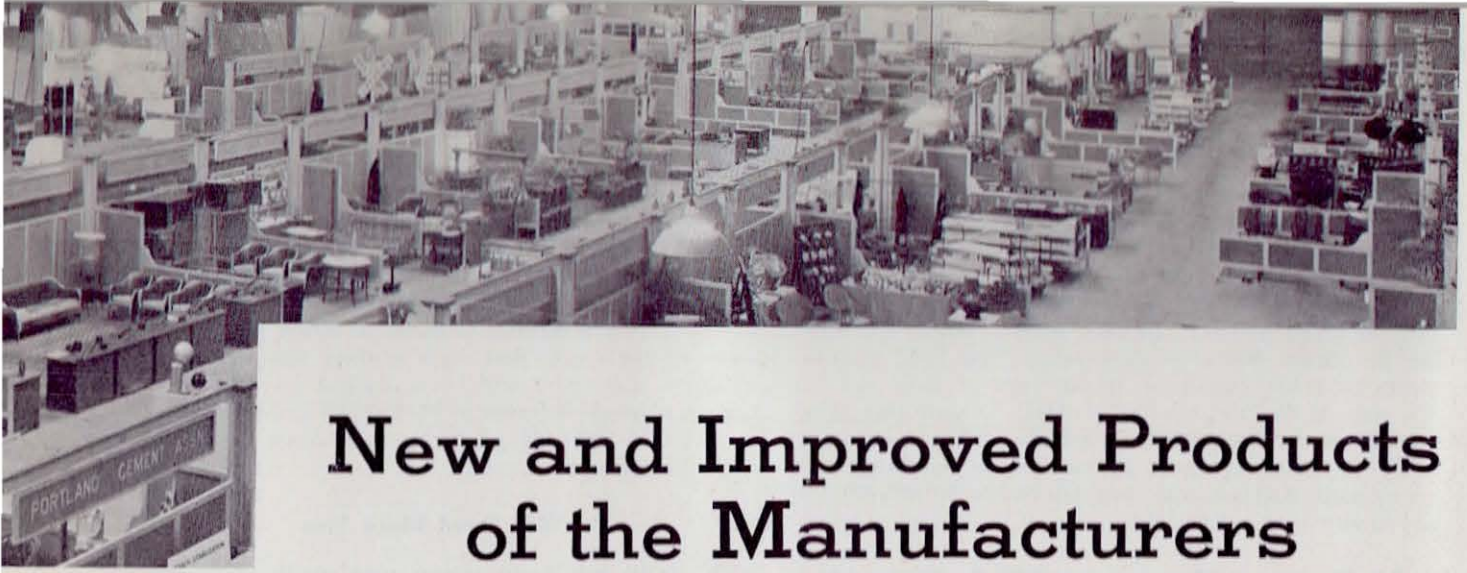
While tie conditions in the main tracks are not much below normal requirements, it is economically sound to make slightly more than normal renewals where rail is laid, where new ballast is applied elsewhere and where the track is given a general raise without additional ballast. For this reason there will be a moderate increase in tie renewals in connection with the extensive rail and surfacing programs that are planned. On the other hand, at the beginning of 1941, when it was becoming clear that the increases in traffic were likely to be permanent, for the railways as a whole there was a subnormal tie condition in yards and sidings, particularly in tracks that had remained unused for several years. During the year a considerable amount of this trackage was rehabilitated as increased traffic required its use, and this was reflected in increased tie renewals during the year. With every prospect that there will be a further increase in traffic this year, many roads are planning more tie renewals in yard and other tracks that still suffer from deferred maintenance.

Weeds and other uncontrolled vegetation on the right of way not only are a nuisance, but they present an unpleasing appearance and create a fire hazard which may be of considerable proportions where adjacent property is improved, is cultivated or is in timber. During the depth of the depression the policing of the right of way was neglected almost universally, and most of the weed-destroying equipment was allowed to be idle rather than to undertake the expense of clearing the property of weeds. Recently, interest in weed destruction has revived and has been gaining momentum for about five years, during which time an increasing number of weed-destroying units have been purchased year by year. That still more attention will be given to this important element of maintenance in 1942 is indicated by the inclusion of 174 weed-destroying units in the budgets for the year.

Bridges Need Attention

As has already been mentioned, there will be a larger than normal expenditure for bridge repairs, which will include trestles as well as steel spans, and will involve the strengthening, rather than replacement, of an unusual number of steel bridges. While only three major jobs of replacing steel bridges were mentioned in the budgets under review, it is planned to retire a number of less important spans, install culverts and substitute embankments for the original structures. Almost all of the budgets provide for a larger program of painting steel bridges than for many years, further evidence of the desire to catch up on deferred maintenance. That there will be an increased amount of bridge maintenance, including both trestles and steel spans, is indicated by the prospective purchases of approximately 600 portable power tools suitable for this work, and 96 portable power plants capable of operating them.

(*Continued on page 555*)



New and Improved Products of the Manufacturers

Ruberoid Blackout Formula for Windows

THE Ruberoid Company, New York, has developed a blackout formula for windows, skylights, etc., which is said to meet with the approval of army engineers and to provide complete opacity, a non-reflecting surface and a high degree of shatter resistance. The blackout formula consists first of an application of a 1/16-in. layer of Ruberoid Plastic Cement over the outside area of each pane. Over this a sheet of No. 15 Ruberoid Saturated Asbestos Felt, cut slightly larger than the pane, is applied and the felt is then covered with another layer of Ruberoid Plastic Cement, applied with a trowel.

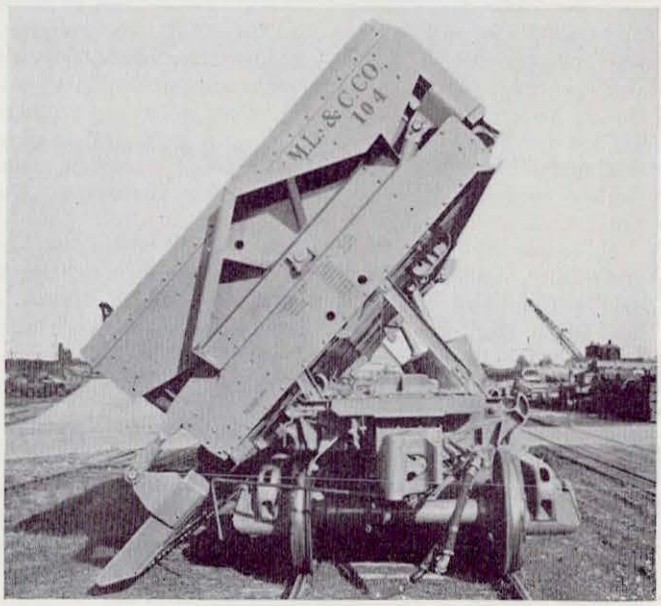
Within 3 or 4 days the surface of the blackout protection will develop a dull black surface that is said to be completely non-reflective. When applied properly, this treatment is said to give complete blackout protection and greatly increases the shatter-resistance of the glass. The materials can be applied quickly and easily, without any preliminary cleaning of the glass and without interior scaffolds to interfere with operations within the building.

Improvements in Dump Cars

NEW and important changes have been made in the design of dump cars manufactured by the Austin-Western Road Machinery Company, Aurora, Ill. Cars recently built by this company feature the use of U. S. S. Man-ten low-alloy high-tensile strength steel to obtain increased strength with light dead weight, the use of roller bearing trucks, car beds of all-welded design and dump cylinders and pistons constructed of welded steel plates instead of castings. Instead of using the old style steel-wood-steel floor construction for heavy duty service, these cars are now built with a single floor plate, welded to all members of the bed underframe, and the cross sills of the bed underframe, in turn, rest upon rubber shock absorbing pads.

Included in the latest dump cars recently built by this company are some 50-cu. yd. level-full, 70-ton capacity cars, for use in handling limestone rock loaded by 20-cu. yd. dippers, which are said to be the largest dump cars ever built. These cars are streamlined in design, are built of U. S. S. Man-ten to obtain the lightest dead weight possible and have the rubber shock absorbing pads between the underframe sill members and the top of the draft sills to absorb loading impacts. This company also has recently built some 30-cu. yd. level-full, 70-ton capacity dump cars of U. S. S. Man-ten, also featuring roller bearing trucks, rubber shock absorbing pads and all-welded car beds. Another development is the construction of hopper cars with air-operated clamshell type doors, the doors being pulled upward and outward similar to the operation of the two halves of a clamshell bucket when the air is applied to the cylinders on each side, allowing the material to dump out of the bottom of the cars between the rails. Some 60-cu. yd. level-full 70-ton capacity hopper cars have been built recently of this design.

Practically all modern dump cars are now constructed of the side-pivot drop or down-turning door type and the old lift-type door is more or less obsolete except in the case of the smaller narrow gage cars. The newer types are simpler in construction and easier to maintain and repair. They are simply a side-tipping body resting on a draft beam, the dumping on either side being accomplished by large diameter air cylinders. A simple mechanism synchronized to work in connection with the movement of the car body moves the door outward and downward in dumping and returns it to normal position.

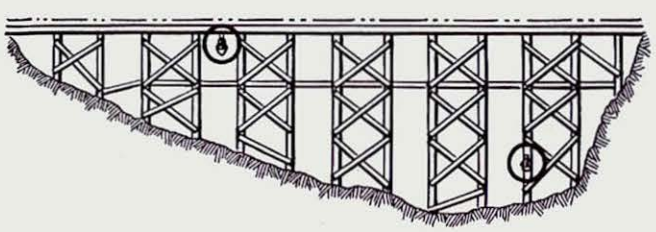


End View of New 50-Cu. Yd. 70-Ton Dump Car in Dumping Position

The down-turning door acts as a chute or apron to keep material away from the track and protect the ballast. The air cylinders push the car bed to the dumping position, usually an angle of 50 deg. with the horizontal, and the bed returns to the normal upright position by gravity when the air is exhausted from the cylinders. The air, as it exhausts, compresses somewhat and cushions the shock of the bed when it returns to the upright position. All dump cars carry their own air supply in reservoirs which charge continuously, as required, through check valves from the air supply on the locomotive. All the cars may be dumped individually or the entire train may be operated as a single unit and in some types of trestle filling the cars may be arranged to dump alternately to relieve strains and stresses on the trestle structure.

Bridge Lighting to Prevent Sabotage

DIRECTING attention to the great value of well-planned night illumination in guarding important bridges against sabotage, lighting engineers of the General Electric Company, Schenectady, N. Y., are urging the illumination of piers, abutments and the undersides of bridge floors, instead of decks and superstructures, and are making specific recommendations as to



Sketch Indicates Recommended Protective Lighting for Trestles Less Than and More Than 40 Ft. High

both the most effective positions of lights and the types of lights to be employed. Where trestles are less than 40 ft. high, they are recommending that Form 79 street-lighting luminaires be suspended from the underside of the deck at intervals of approximately 100 ft., employing a spring hanger between the bracket and luminaire to lessen the effect of vibration on the lamp. This arrangement, they point out, provides a symmetrical light distribution pattern over a wide area about the footings of a structure, without deep shaded areas, and also insures adequate lighting if one lamp should fail.

For trestles higher than 40 ft., Form 79 VR street-lighting luminaires are recommended, mounted on the outside vertical structural members about 25 ft. above the ground and spaced from 150 ft. to 250 ft. apart. The universal-mounting brackets provided with these luminaires have horizontal and vertical adjustments to compensate for rake and to make it possible to light a wider approach area.

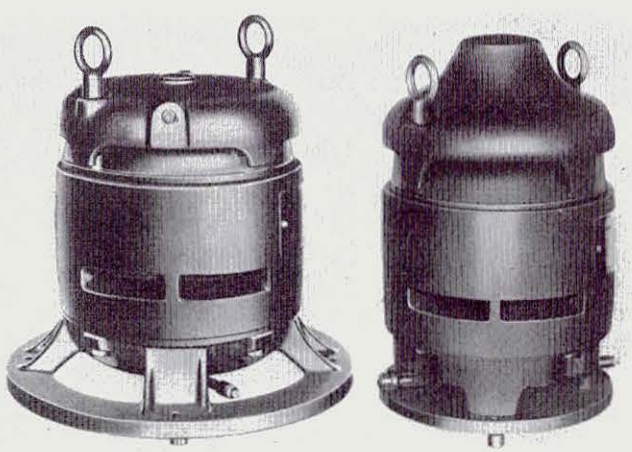
For bridge spans with piers less than 100 ft. apart, the company's engineers recommend that narrow- or wide-beam floodlights be mounted on each pier to throw light on the adjacent piers. They point out that the number of floodlight units required will depend upon the size of the piers, but that, in general, one watt per square foot of pier area will be sufficient. They point out also that some light should spill on the water surrounding the piers, but that, if the river is navigable, care should be taken to protect approaching craft against glare.

For the lighting of the piers and abutments of structures with spans in excess of 100 ft., it is recommended that the floodlights be suspended beneath the decks at mid-points of the spans and directed toward the piers and abutments. As with luminaires suspended directly from the decks of low trestles, it is recommended that provision be made through rubber or spring mountings to dampen vibration. In all cases, enclosed-type floodlights are recommended in order to protect the reflector and interior generally against moisture, smoke and dust.

General Electric Adds to Its Line of Tri-Clad Motors

THREE new vertical motors have been added to the line of Tri-Clad motors built by the General Electric Company, Schenectady, N. Y.; a general-purpose polyphase motor, 1 to 20 hp.; a shielded polyphase motor, 1 to 20 hp.; and a shielded single-phase motor, 1 to 5 hp. The shielded-type motors are suited especially for pumping applications and the general-purpose motors, as the name indicates, are suitable as power units for almost any general type of work. These motors all feature the Tri-Clad improvements which include better mechanical protection through the use of a cast-iron box-type frame, balanced design and better electrical protection by the use of Formex, a new type of magnet wire.

The new general-purpose type motors are designed to give added protection to the parts without materially increasing the over-all height. New punchings and coil shapes, double-end ventilation and balanced design are features of these motors, contributing to long life. All openings in the general-purpose motor are shielded to prevent the entrance of chips or other foreign matter. Accurate alignment to the driven unit is assured by machined rabbets on the stator frame and base. Rotating weight and thrust are supported by the lower bearing, which is fitted to a one-piece base. The bearings are of the deeply-grooved type, encased in machined cast-



Two G-E Tri-Clad Vertical Squirrel-Cage Polyphase Induction Motors, General-Purpose at Left, and Shielded at Right

iron housings. The grease fittings are located at easily accessible points. The location of eyebolts makes the motors easy to handle and a variety of bases are avail-

able to adapt them for many applications and mounting requirements.

Both the polyphase and the single-phase shielded-type motors are adapted to either normal- or high-thrust applications, and are suitable for outdoor operation except where extremes of moisture, dust, etc., make the selection of fan-cooled motors more economical. The cover of the motors is contoured to deflect dripping liquids and falling objects and all openings in the stator frames and end shields are protected against the entrance of splashing liquids. Air is discharged downward at low velocity, preventing excessive dust disturbance. All frame sizes have common mounting dimensions, making possible the interchange of many power and speed combinations, including single-phase ratings. The motors can be rotated to any one of four base positions without modification of the supporting structure.

The polyphase shielded-type motors are available with either solid-shaft or hollow-shaft construction, while the single-phase motors are available only with solid shafts. The hollow shafts facilitate motor installation and impellor adjustment for pump installations. In such installations, the pump shaft passes through the hollow motor shaft and is supported by an adjusting nut. Torque is applied to the pump shaft by either a nonreversing ratchet or a jaw-type coupling. A nonreversing ratchet eliminates motor reversal, from the reversal of phase rotation, or from the backward flow of water through a pump.

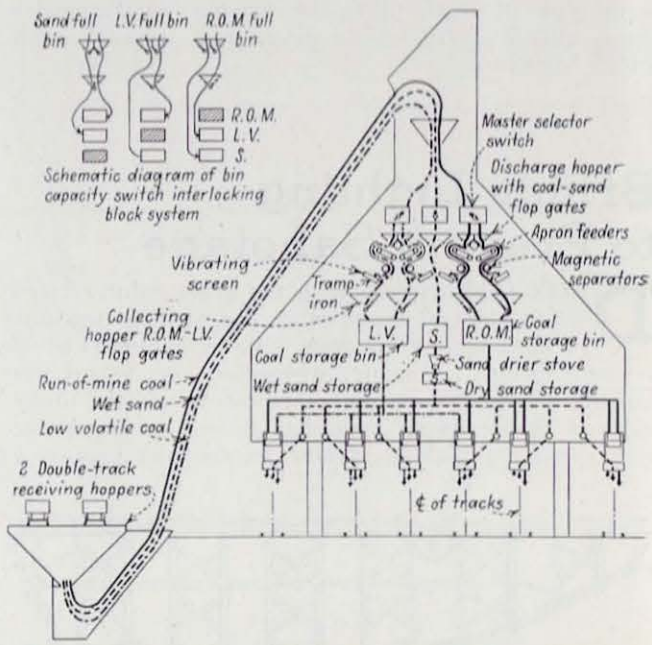
Coaling Station With Automatic Controls

AN interesting example of a modern 1,250-ton reinforced concrete coaling station, featuring centralized remote control of all operations for hoisting and distributing two kinds of coal and wet sand, is a station recently built by the Roberts & Schaefer Company, Chicago, for the Pennsylvania at the 28th street terminal, Pittsburgh, Pa. During the first year of its operation this station had an output of 550,000 tons of coal, with a daily peak of 3,000 tons.

Briefly, the station is an overhead type of reinforced concrete construction serving six tracks which pass under the station. In addition to run-of-mine coal, it was designed to handle low-volatile coal for yard engines and for through locomotives while operating within the city limits. It has a capacity of 1,000 tons of run-of-mine coal, 250 tons of low-volatile coal and 50 tons of dry sand. The coal is delivered through 12 gates, 2 on each track, 8 of which deliver run-of-mine coal and 4 of which release low-volatile coal. Sand is delivered to all 6 tracks. The gates are manually operated from a platform extending entirely around the coaling station.

A View of the Westerly Side of the Coaling Station

The outstanding feature of the station is the automatic operation of the hoisting and distribution system, con-



A Flow Diagram Showing the Routing of the Various Materials Through the Distribution System of the Coaling Station, Which Is Actually Located in the Tower Portion

trolled by master selector switches, push buttons and interlocking relay circuits to safeguard the different operating cycles. The material is hoisted from two separate double-track unloading hoppers, each with a capacity of 80 tons, by two 135-cu. ft. skip-hoist buckets into separate collecting hoppers at the top of the station. These collecting hoppers are provided with motor-operated flop gates, the position of which is determined by the master selector switch in accordance with the material being handled. Sand passes directly from these hoppers into a wet-sand storage bin and thence to screens and dryers and to a dry-sand storage bin. Coal is discharged onto motor-operated apron feeders, thence over drum-type magnetic separators and through other motor-operated flop gates to either the run-of-mine bins or the low-volatile bins, depending upon the type of coal being handled.

All the controls for the operation of the station are located in a hoist house placed at track level at one end of the station between the two hoist-bucket runways. A complete set of controls, including a master selector switch and push buttons, is provided for each hoist, and with this arrangement it is possible to hoist and distribute any two of the three materials this station handles, simultaneously, such as both types of coal or either type of coal and sand. A series of colored lights indicate if the flop gates are in proper position, if the apron-feeder is in motion and if the magnetic field of the separator is energized, and all push button controls are interlocked so that it is impossible to start the hoisting operations

unless everything is properly set and adjusted for handling the material for which the master selector switch is set. Full bin-capacity switches are provided which stop the hoisting when the bins are full. In addition, the hoist buckets may be set for automatic operation or manual push-button operation and when automatically-operated they may be set for interlocked counterbalanced operation (one bucket hoisting while the other is returning), thereby saving on power consumption.

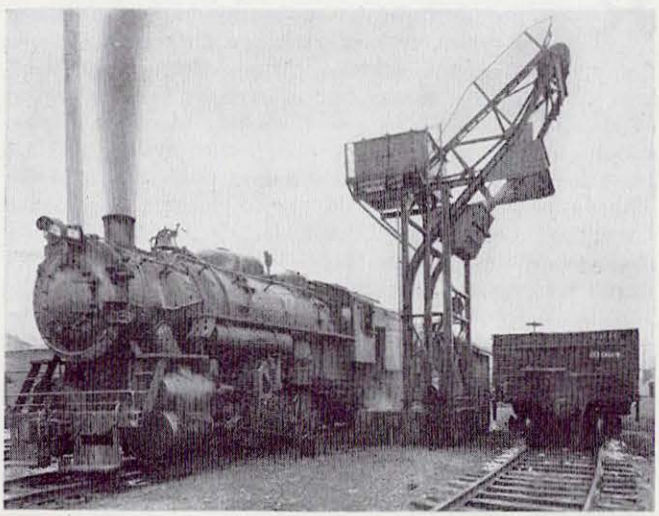
Improved N. & W. Cinder Handling Plant

THE Ross and White Company, Chicago, has recently developed and installed a number of N. & W. type mechanical cinder handling plants of an improved design, which has definite advantages from the standpoint of the low height of the structure, the elimination of the steel apron for conveying the cinders from the bucket dump to the shipping-out car, and its heavy H-beam continuous type of bucket guides.

The hoist is located underneath a No. 10 steel plate in a weatherproof house slightly above the elevation of the bucket dump so that the hoist house is readily accessible by ladder from the ground. All of the operating machinery, such as the hoist motor and control, is operated in this house and a push button station in a cast iron weatherproof enclosure is attached to the side of the structure near the ground for the operator's use in controlling the bucket.

In cold climates, serious objection has been made and definite difficulty experienced in connection with steel hinged aprons for the delivery of cinders from the bucket at its dumping point to the shipping-out car. The wet cinders freeze slightly in the apron at each discharge of the bucket and there is therefore an accumulation of ice and frozen cinders in the apron during low temperatures, which in time interferes with the discharge of the bucket and which must be cleaned out by some mechanical means or by heating the apron. This new cinder plant eliminates the apron entirely and provides only an adjustable baffle at the dumping point to cause the cinders to discharge properly in the center of the car.

The skip bucket is made of solid construction, without gates or any other similar mechanism. The bucket rollers are of the anti-friction type and operate continuously from the cinder-receiving hoppers to the dumping point in enclosed heavy guides so that the bucket is assured of being kept in its proper line of travel at all times. Ample clearances are provided, both horizontally and vertically and the unit may be installed for a single track or a number of tracks. The distance from the cinder shipping-out track to the first engine track is a minimum of 24 ft. and the engine tracks may be spaced any distances desired. The cinders are loaded into the skip bucket from cast iron cinder-receiving hoppers which are 12 ft. long, with cast iron control gates and which have a capacity of about 90 cu. ft. A locking mechanism is provided on the hoppers so that the gates cannot be opened except when the bucket is in its proper filling position underneath the selected hopper.



A Two-Track Improved N. & W. Type Cinder Plant Recently Installed

Black-Out Panels of Douglas Fir Plywood

WEST Coast railroads have discovered a new use for Douglas Fir Plywood—black-out panels for windows in yard offices, dispatchers offices and other locations where offices essential to the night operations of the railroads must be lightproof. Almost simultaneous with the first blackout announcement, the railroads began to order panels to cover windows in such night workrooms.

Interior of a Yard Office on the West Coast, Showing the Douglas Fir Plywood Black-Out Panels in Place Over the Windows

The most popular way of installing the panels for obscuration has been with the use of turnbuckles that not only hold the sheets in place but hold them tight against the window casings to prevent light escapement. In some instances temporary casings were first nailed in place so the plywood would fit tightly inside. Plywood can also serve as a measure of protection from flying glass, if properly installed. The book "Blackouts" published several months ago by the Office of Civilian Defense explains that if panels are hung with rubber bands or elastic material so that they can swing in with the blast, the flying objects will hit the panel and fall to the floor while the blast dissipates inside the room. This protection, of course, is only relative, dependent upon the proximity and size of the bomb.

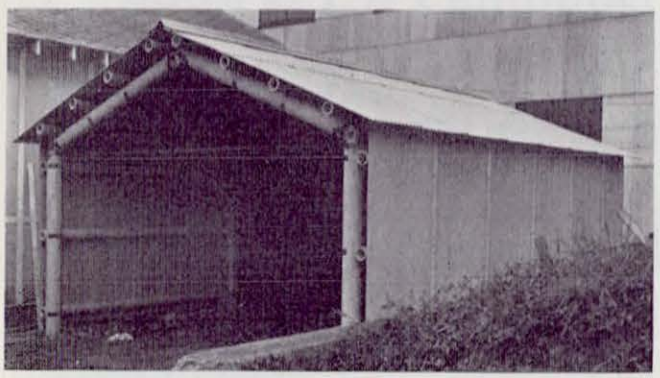
In most instances the plywood chosen for blackout material has been of the lower grades and thinner panels.

Quarter-inch Plywall (wallboard) or the 5/16-in. Plyscord (sheathing) grade have been most popular. Dependent upon the size of the window and the thickness of the panel, sometimes a frame work is tacked on panel edges to give added stiffness.

Although the blackout panels put up by West Coast railroads have not been used since the opening days of the war, they are built and stored for ready installation if the need arises.

Asbestos-Cement Buildings

ANTICIPATING that there may be an acute shortage of some materials, especially steel, and that there is a definite need for alternate materials, Keasbey & Mattison Co., Ambler, Pa., have developed a method of building construction, which utilizes asbestos-cement products for all parts of the structure, including structural members, sheathing and roofing.



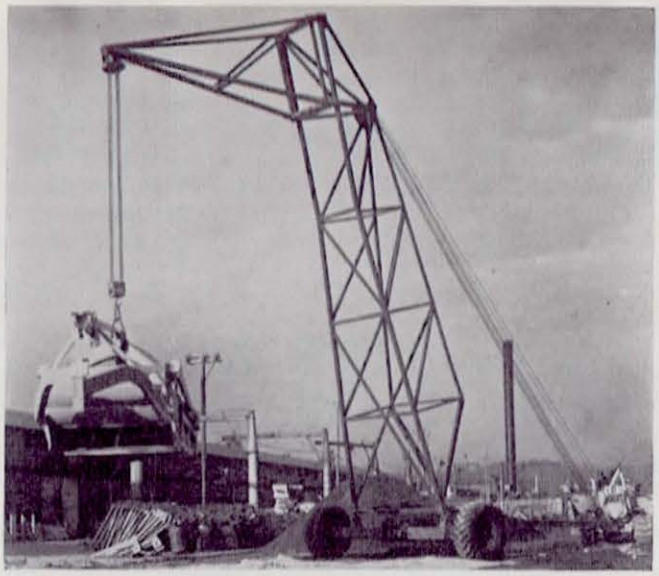
A K. & M. Asbestos-Cement Building

The new buildings use K. & M. Century asbestos-cement tubular sections for structural members, Century asbestos corrugated sheathing for the roof and Century sheet asbestos for the sidewalls. The buildings are based on units 16 ft. long, 12 ft. wide and with a clear height of 15 ft. A structure of any size can be constructed by simply combining the required number of 12-ft. by 16-ft. units. It is said that such buildings can be erected quickly by unskilled workmen and that they are fire-resisting, weather-resisting and maintenance free.

Tournapull Cranes

TWO tractor cranes, the L20 and L40, which were developed for the quick and easy handling of bulky, heavy materials, have just been released to the market by R. G. Le Tourneau, Inc., Peoria, Ill. Both cranes are of all-welded box-type construction from special steels and are mounted on two large pneumatic-tired wheels. The cranes are connected to the tractor by a steel ridge pole and by the operating cables. In upright position the cranes will lift 20,000 lb. at a horizontal distance of 20 ft. 6 in. from the axle center of the crane. The L20 has a 20-ft. boom length and the L40 a 40-ft. boom length. The cranes are operated from any size of tractor or Tournapull equipped with a LeTourneau double-drum power control unit.

The cranes offer a large lifting power with tractor mobility. The large rubber tires permit travel over concrete surfaces and provide ample flotation for working in soft, mucky conditions. The cranes may be connected to or disconnected from the tractor or Tournapull quickly and easily, releasing the power unit for other work and they may be towed behind trucks for transporting from job to job.



An L40 Tournapull Tractor-Crane at Work

The general specifications of the L40 crane are as follows: Overall height upright, 48 ft.; overall width with single 21-in. by 24-in. 20-ply tires, 20 ft.; overall length, 57 feet, 3 in.; length of boom structure, 44 ft.; maximum height from hook to ground, upright position, 41 ft. 6 in.; horizontal distance, axle center to hook upright position, 20 ft. 6 in.; distance from axles to tractor drawbar, 35 ft. 9 in.; length of boom line (½-in. 6-by-19 preformed wire rope), 600 ft.; length of hoist line, same type of wire rope, 415 ft.; and approximate shipping weight 16,600 lb.

Osmos Process Gets Wider Application

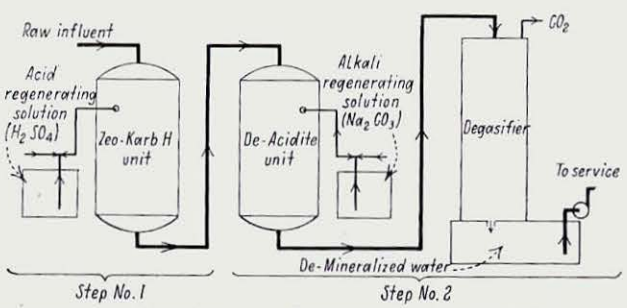
RECOGNIZING that of the total area of most timbers used in railway construction and maintenance, only a relatively small part is vulnerable to serious decay, the Morrison Railway Supply Corporation, Buffalo, N. Y., has extended the field of its Osmos process of wood preservation to a wide variety of railway applications, other than poles, although the process was applied to more than 150,000 standing poles during 1941. The Osmos process, employing a chemical compound known as Osmoplastic, with deep-penetrating, strong toxic properties, and yet non-corrosive, is being recommended for use in treating field-bored bolt holes, and for treating cut surfaces of untreated and treated timbers, such as bridge caps, stringers, ties and guard rails, in both new construction and repair operations. In such applications, it is intended to give full protection against rot and fungi to parts particularly vulnerable to attack because of either exposure or mechanical abuse.

Osmoplastic is also being recommended for treating the tie-plate bearing areas of crossties, and especially the wood around spike holes when respiking rail. In this latter application, in which a small batch of the com-

pound is put in the spike hole and followed by a treated tie plug, it is said that the chemical will penetrate the wood deeply, kill all fungi present and retard further attack—thus preserving the most vulnerable part of the tie and prolonging the spike-holding power of the wood.

Permutit Zeo-Karb Water Softeners

A RECENT development in water conditioning practice is the use of a new organic zeolite, Zeo-Karb, by the Permutit Company, New York, which has new and unusual properties and which is adapted to the treatment of locomotive boiler feedwater, and water for Diesel engine cooling or for air conditioning units. Zeo-Karb is different from ordinary zeolite in a number of respects, the most important being that it is resistant to aggressive attack by acids and that it will operate on either the H ion cycle, with acid regeneration, or on the sodium cycle (like ordinary zeolites), with salt regeneration. It is practically non-siliceous and this attribute is also said to make it particularly suitable for treating feedwater where the possibility of even minute increases in silica content, caused by dissolving silica from ordinary zeolite, is undesirable.


Raw influent
Acid regenerating solution (H_2SO_4)
Zeo-Karb H unit
De-Acidite unit
Alkali regenerating solution (Na_2CO_3)
Degasifier
CO_2
To service
De-Mineralized water
Step No. 1
Step No. 2
Replacement of metallic cations by hydrogen (H ION) converts salts present in raw water into corresponding acids, viz. HCl, H_2SO_4, H_2CO_3
Removal of acids formed in step No. 1 The HCl and H_2SO_4 are absorbed in the De-Acidite unit and the H_2CO_3 decomposes into H_2O and CO_2, this CO_2 escaping to the atmosphere in the degasifier

A Diagram Showing a Simplified Treatment Process with a Zeo-Karb H Unit, a Deacidite Unit and a Degasifier

This new type of zeolite can function in two ways, as an ordinary zeolite replacing calcium and magnesium compounds with their chemical equivalents in sodium compounds, or as an acid-regenerated zeolite, in which case it is referred to as Zeo-Karb H. When water is passed through Zeo-Karb H, all the metallic cations present, including sodium as well as calcium and magnesium, are replaced by the hydrogen ion. Thus any bicarbonate (HCO_3 ion) is converted to carbonic acid (H_2CO_3), which readily decomposes upon simple aeration into H_2O (water) and CO_2 (carbon dioxide gas). Thus any bicarbonate present in the water can be eliminated to any extent desired. This is said to be the first time a simple and practicable chemical means has ever been developed for removing sodium bicarbonate from solution.

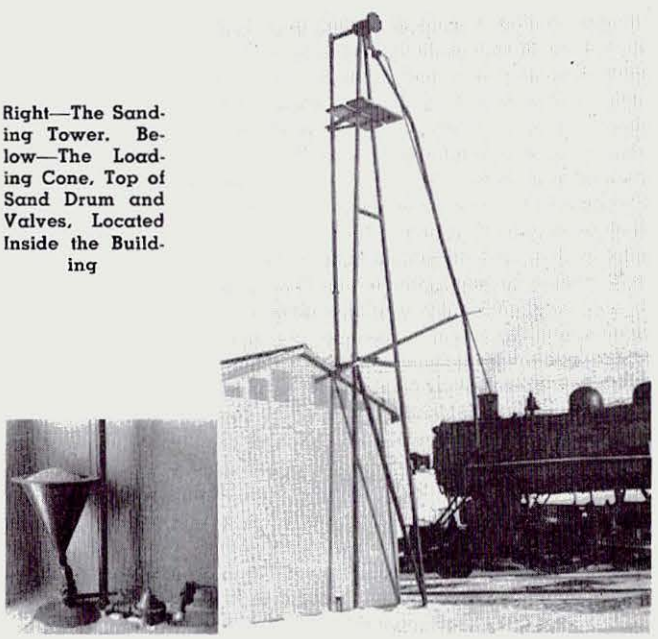
Most waters, however, contain sulfate and chloride anions, in addition to bicarbonates, together with a mixture of calcium, magnesium and sodium cations. When water of such composition is passed through Zeo-Karb H equipment, the carbonates and bicarbonates are reduced to CO_2 and water, the chlorides are converted to hydro-chloric acid (HCL) and the sulfates to sulfuric acid (H_2SO_4). Usually, these acids are then neutralized by a quantity of water issuing from a conventional sodium zeolite softener, or from a second Zeo-Karb unit operating on the sodium cycle. When effluents from Zeo-Karb units operating on hydrogen and sodium cycles are blended in the proper proportions, water of the desired neutrality and low total solids is produced. Scale incrustants are reduced to zero and total dissolved solids are reduced by the amount of bicarbonates which it is desirable to remove from the water. Such residual alkalinity as may be required can be easily maintained. This performance is superior to that possible by treatment by cold lime or by other chemicals.

A simple and practical application of Zeo-Karb treatment is through the use of a Zeo-Karb H unit and a deacidite unit, connected in series. The Zeo-Karb H unit is regenerated with sulfuric acid (H_2SO_4) and the deacidite unit is regenerated with sodium carbonate (Na_2CO_3). The effluent from such treatment is finally passed through a degasifier to remove the CO_2 gas. This effluent is neutral and it has a low hardness and low total solids.

It is said that this unit is simple, compact and automatic, requires only occasional recharging with regenerating chemicals and will produce locomotive boiler feedwater superior in quality to that which can be produced by any other known means of chemical treatment. The Permutit Company has spent years in the development of Zeo-Karb and before introducing it to the market, confirmed its qualities by field testing over a long period.

Locomotive Sand Plant

THE Ross and White Company, Chicago, has developed and installed a low capacity direct locomotive sanding arrangement which eliminates the cost of installing an overhand dry-sand storage tank. The new arrangement involves blowing the sand directly from an air drum located in the sand drying house to the locomotive sand domes. It consists of a loading cone and sand drum connected to the locomotive sanding pipe, which is supported by a suitable pipe tower arrange-



Right—The Sanding Tower. Below—The Loading Cone, Top of Sand Drum and Valves, Located Inside the Building

ment. A flexible 2-in. hose is attached to the outlet end of the sand delivery pipe.

The sand drum, located in the sand drying house, is connected to an air line and is subjected to about 75 lb. air pressure at all times except when it is being filled with sand. To prevent this high air pressure from blowing sand over the locomotive, a special cone-shaped air-reducing valve is used to elevate the sand through the pipe to a special compartment at the top of the tower and this reduces the pressure to the extent that a quiet, easy flow of sand is secured when sand is taken. To take sand, the hostler places the hose in the sand dome and pushes up on a rod connected to a special sand valve at the top of the tower, which works against spring pressure.

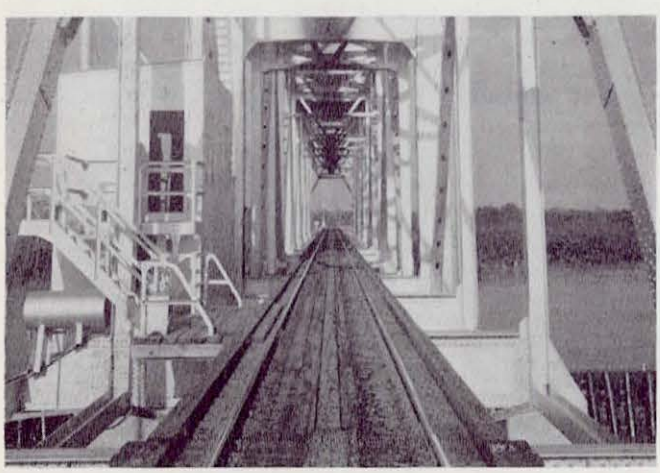
When the sand dome is full, the rod is released and the valve closes automatically.

To load the sand drum, the air valve is closed and the valve between the loading cone and the drum is opened. The loading cone consists in reality of two concentric steel cones, of which the inside cone is slightly smaller in diameter and is perforated with numerous small holes. The inside cone serves as a screen to retain all foreign matter, while the dry sand runs down into the drum by gravity. When the drum is filled, the loading cone valve is closed and the air pressure valve is opened.

This plant may be used with dry sand shipped in and stored in the building or it may be used in the sand house where the green sand is dried.

Wolmanized Lumber on New Neches River Bridge

AN interesting example of the use of Wolmanized lumber which was treated by the American Lumber & Treating Co., Chicago, is the new single-track vertical lift bridge of the Kansas City Southern over the Neches river at Beaumont, Tex. The deck of



Wolmanized Timbers Were Used on the Deck of the Neches River Bridge to Obtain Resistance to Decay, Light Weight and Reduced Fire Hazard

this bridge, including ties, guard rails and walkway planking, was constructed of Wolmanized lumber to obtain the threefold advantages of resistance to decay, light weight and reduced fire hazard.

The Neches river bridge, which is the newest vertical lift bridge in the United States, has a span of 245 ft., with a clear channel between piers of 200 ft. The towers above the pier level are 199 ft. high and the lift section, when raised, has a clearance of 150 ft. above mean low water. The lift span is operated by a 75-hp. motor and control equipment, developing a rise of 131.6 ft. in 2 min. and 45 sec.

The deck material was treated to a retention of 0.3 lb. per cu. ft. of Wolman salts (Tanalith). All of this lumber was dense yellow pine and was ordered and specified to meet the density rule of the Southern Pine Association, except the walkway planking, which was No. 1 common Southern yellow pine. The fenders at the piers were constructed of yellow pine, all of which, including the piling, whaling timbers and braces, were treated with 24 lb. of creosote per cu. ft. One of the important considerations in the use of Wolmanized material for the deck of the bridge was the lighter weight on the lift span.

Kalamazoo No. 65 Officials' Inspection Car

THE Kalamazoo Railway Supply Company, Kalamazoo, Mich., has recently placed on the market a new model of its No. 65 Officials' Inspection Car. This model has a Ford V8 engine and comfortable bus-type seats. The seating arrangement is flex-

The Kalamazoo No. 65 Will Seat Nine People, Has a Ford V8 Engine and Comfortable Bus-Type Seats

ible, to suit requirements, and seating capacity can be provided for nine people, including the driver. A trunk or compartment at the rear accommodates baggage, etc.

The car is equipped with a standard Ford transmission, with three speeds forward and one reverse, plus the Kalamazoo reverse gear transmission, which provides for equal speeds in either direction. Final drive is by a triple roller chain on each side from the reverse transmission to the rear axle. The car axles are $2\frac{7}{16}$ in. in diameter and the wheels are of cast steel, flanged and 20 in. in diameter, or rubber cushioned wheels of the same diameter may be ordered as optional equipment. Four-wheel self-aligning adjustable toggle lever brakes, with replaceable cast iron shoes, are provided as standard equipment, or the car may be equipped with air brakes or vacuum brakes.

The body of the car is made of steel panels insulated below the window sills. The floor is insulated with Celotex and covered with Mastipave and the roof is of slatted wood construction, covered with waterproof black

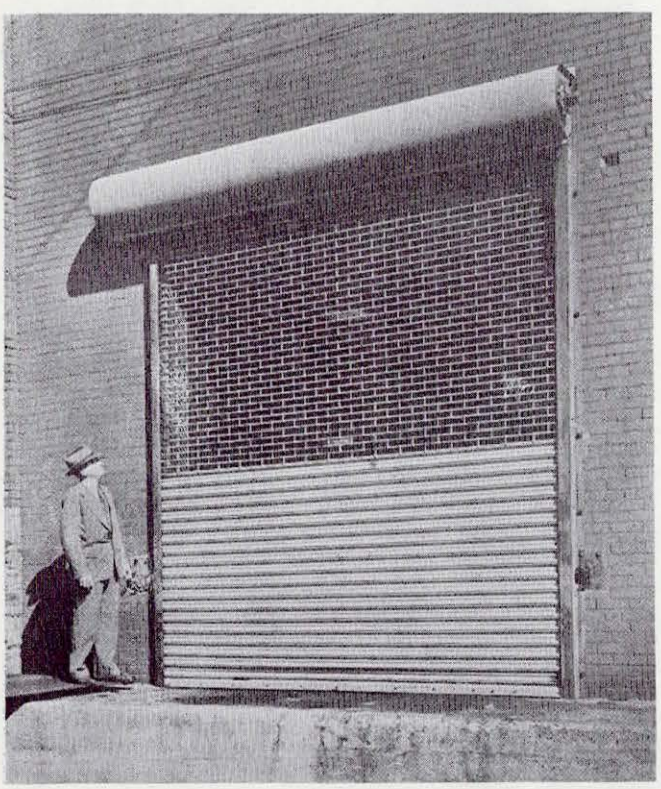
fabricoid. The inside below the windows is finished with plywood, walnut stained and varnished and the outside may be painted any standard color. The windows are of plate glass, with shatterproof glass optional. All windows except those in the front can be raised or lowered to any position. The body is mounted on a main frame constructed of 4-in. steel channels, securely braced, riveted and welded to all joints and a steel pilot is rigidly mounted to the main frame at the front of the car.

Electrical equipment consists of a starter, generator and ignition system, two front head lights, one rear head light, two marker lights, two interior lights and an electric horn. In addition to the optional equipment already mentioned, the car may be equipped with either hot air or hot water heater and with a turntable mounted on the main frame of the car and operated by a portable hydraulic jack. By means of the turntable and jack, the car can be raised from the rails and turned around, with a man at each corner to steady it.

Combination Rolling Door

THE Cornell Iron Works, Inc., Long Island City, N. Y., has made a recent installation of a novel combination of rolling door and rolling grille, with the lower half of the door made of regular horizontal interlocking mouldings of cold-rolled copper-bearing hot galvanized steel slats and the upper half made of a bar-type rolling grille providing ample protection, without blocking light, air or vision. The entire door rolls up overhead, out of the way when not in use. It is operated from either inside or outside by means of a hand-crank shaft running through the wall.

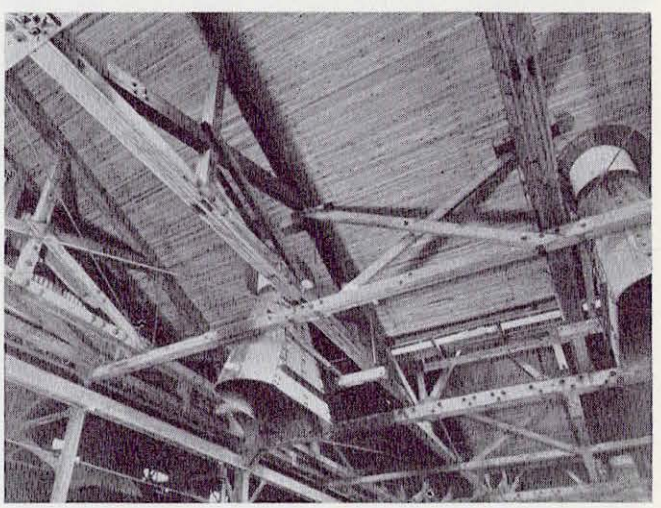
The rolling doors are retained at the sides in steel guides set in the wall or door jambs, and roll up overhead on a steel pipe roller, called the shaft, which contains counter balancing springs, permitting the door to be operated with ease. The doors may be the self-coiling type operated by pushing up or pulling down by hand, or they may be operated by motor, by hand-chain and gears or by hand-crank and gears. They can be made practically any height or width desired. The doors are said to be exceptionally strong and to be constructed of long-life corrosion-resistant materials.



A Recently-Installed Novel Combination of Rolling Door and Rolling Grille

Timber Connectors Find Increasing Use

UNDER the war-time conditions which are producing shortages in certain structural materials, while timber continues to be available without restrictions, Teco timber connectors of various types, manufactured by the Timber Engineering Company, Washington, D. C., are finding increased application for both light and heavy frame timber construction. Designed initially to replace ordinary bolted joints in which it is impossible to develop the full cross-sectional working strength of the members joined, Teco connectors, which are simple metal rings inserted in slots grooved around a single bolt hole in adjoining faces of timbers, decentralize joint stress and distribute it over nearly the entire cross sections of the timbers.



Enginehouse of the Big Four at Bellefontaine, Ohio, Showing Pre-Fabricated Roof Trusses Built by the Teco Connector System of Timber Engineering

Since 1933, when a group of American lumber producers made these connectors readily available in the United States, the engineering technic which these fastenings have introduced into frame construction has revised the conception of many engineers as to the possibilities of timber in building construction and has placed its use on a more exact handbook basis, similar to that enjoyed by other recognized construction materials. Adding to the advantage of these connecting units in that they permit the more widespread use of a readily available material and, through their effectiveness, economize in the use of this material over earlier methods employed in frame construction, is the fact that little training is required for the fabrication and erection of connector-designed and built structures, it being pointed out that ordinary building trades labor has proved satisfactory for most of the 30,000 connector-equipped buildings erected during the last nine years.

Fifty-two railways have already employed connector

construction for a variety of structures, including bridges, trestles, enginehouses, warehouses, coal and ore loading docks, passenger stations and tank towers. A recent use of this construction on the railways was made in the pre-fabrication of creosoted timber roof trusses for an enginehouse of the Big Four at Bellefontaine, Ohio, an installation which, incidentally, led to a test which showed that the treating of preframed timbers for connector-type joints does not distort the timbers or the grooving done on them to the point where ready fabrication and erection are interfered with.

The test referred to was conducted at the treating plant of the American Creosoting Company at Indianapolis, Ind., employing structural grade yellow pine timber. In it, the ends of full-size members of one complete timber joint were cut to exact shape, and the bolt holes and connector grooves were cut, following which the pieces were creosoted by the method ordinarily employed for roof truss timbers. Measurements made subsequent to treatment showed that swelling resulting from the creosoting process caused little variation in the shape of the grooves. Along the grain, the diameter of the grooves was from $\frac{1}{32}$ to $\frac{1}{16}$ in. larger than across the grain, a difference which interfered in no way with easy insertion of the connector rings.

Upson Develops Dubl-Thik Fibre-Tile

THE Upson Company, Lockport, N. Y., has placed a new strong, thick, tile-like material named Upson Dubl-Thik Fibre-Tile on the market, which is easily applied and is adapted for new construction or for the modernization of old wash rooms and lavatories to provide an attractive, clean and sanitary appearance. Dubl-Thik Fibre-Tile is a wall board nearly $\frac{3}{8}$ in. thick, with one surface molded in 4 in. squares to simulate tile construction. This surface is smooth and is specially processed to eliminate the expense of applying a sizing coat. The walls are finished by painting with any color of enamel desired.

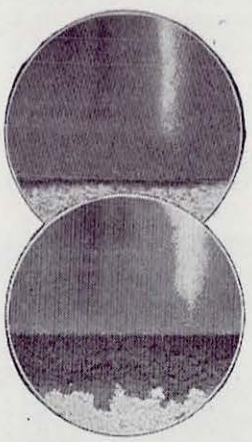
Dubl-Thik Fibre-Tile May Be Used for New Construction or for Remodeling Old Washrooms, Lavatories, etc., and Provides An Attractive, Clean and Sanitary Appearance

Dubl-Thik Fibre-Tile comes in panels 4 ft. by 8 ft., 4 ft. by 10 ft. or 4 ft. by 12 ft. in area, which will reach from corner to corner or from opening to opening of the average size room, thereby greatly reducing installation costs. In new construction, the panels are applied directly to studs and are secured by floating fasteners which anchor the panels securely from the back, eliminating unsightly nail holes. In remodeling work, the panels can be applied directly over the old plaster.

Dubl-Thik Fibre-Tile is said to have great strength because of its extra thickness, to have an insulation value that compares favorably with that of specialized insulation materials, and to have a low application cost and a low finishing cost. A number of special decorative mouldings are available for use with Dubl-Thik Fibre-Tile.

Colorflex-Plus

A NEW combination floor treatment, named Colorflex-Plus, has been placed on the market by the Flexrock Company, Philadelphia, Pa., which cleans, colors and preserves new or old wood or concrete floors, providing a smooth dustproof attractively-colored floor. Colorflex-Plus is not a paint, but a resin-based floor treatment in which the resin itself is colored. The Colorflex-Plus unit consists of two materials, Floor-Ready and Colorflex, which are supplied in one package, consisting of a dual container.



Above—How Paint Remains on the Surface. Below—How Colorflex-Plus Penetrates Concrete

In applying Colorflex-Plus, the floor is first swept clean. Then one pound of Floor-Ready is mixed with one gal. of water (preferably warm) and the solution is spread over the floor and allowed to remain for 15 min. The floor is then scrubbed thoroughly with a stiff brush and flushed several times with clear warm water until all residue is removed. The floor surface is then allowed to dry thoroughly (a minimum of 8 hr. is recommended), after which the Colorflex is stirred thoroughly and applied with a roof or push brush. Two coats of Colorflex are applied. The first may be applied in the evening and it will be dry for traffic the next day. The second coat may be applied the following evening.

It is said that Colorflex-Plus provides clean, attractive, richly-colored, dust-proof floors with an enduring finish that cannot wear off because it is part of the floor itself

and that it wears smoothly and evenly under any type of traffic without dusting, chipping, scarring or peeling. Colorflex-Plus is available in four colors, tile red, emerald green, linoleum brown and battleship gray.

J-M Perforated Asbestos Felt

JOHNS-MANVILLE, New York, has recently added J-M Perforated Asbestos Felt to its line of felts for industrial built-up roofing, which reduces to a minimum the formation of so-called "blisters" formed by air entrapped under or between felts during their application.

The principle of the perforated felt, although an innovation in a built-up roofing material, is not new. It is commonly employed in the installation of waterproofing membranes, where for many years an open weave fabric has been used successfully. As its name implies, the new felt is perforated with numerous small holes. These perforations serve a double purpose. They allow trapped air to escape during application when each tiny hole acts as a vent through which the air is forced out as the felt is laid down, but which becomes entirely sealed with the hot waterproofing asphalt when the felt is broomed in. Thus blistering hazards are practically eliminated. The other important purpose of the perforations is the greater flexibility that they lend to the felt, allowing it to conform more readily to irregularities in the roof deck, thus making the felt easier to handle in hot or cold weather.

The new J-M Perforated Asbestos Felt is fire-resistant and rot-proof and the advantages of this felt have been thoroughly tested in more than two years actual service.

Pennsylvania Reports on Its Large 1941 Traffic

(*Continued from page 534*)

facilities in the interest of improved service to the public."

"The additional equipment," President Clement points out, "the heavy expenditures for maintenance and repair work, the extensive program of property and operating improvements progressed in recent years are indicative of your company's efforts to be prepared to meet the defense needs of the country."

The railroad's 1941 freight revenues, amounting to $477,008,587, increased 31.2 per cent, while passenger revenues, totaling $89,022,892, rose 24.3 per cent. Principal items of increase in operating expenses included $18,733,488 in maintenance of way; $37,144,449 in maintenance of equipment; and $46,020,503 in transportation, to carry the increased traffic. Increased wage scales, effective September 1, 1941, added to the costs of all departments. On the basis of 1941 payrolls, President Clement estimates the increased cost per year, for the Pennsylvania Railroad, at $38,000,000.

Taxes, amounting to $66,159,548, increased nearly 51 per cent over the previous year. All taxes absorbed 10.8 cents out of each dollar of operating revenue, and was equivalent to 10.1 per cent, or $5.04 per share, on the stock. "As emphasized in previous years," says Mr. Clement, "the railroad is the only form of transportation, used generally by the public, that provides its own right of way and terminals, pays for their maintenance and, in addition, pays taxes for the support of government."

The net railway operating income for the year ($97,102,488) was equivalent to a return of 3.6 per cent upon the investment in road and equipment.

Fixed charges, chiefly rentals for leased roads and interest on debt, decreased $639,339, the largest item being a decrease of $530,575 in rent for leased roads and equipment. Of the total of $50,027,308 paid for the latter purposes, $31,343,249 was returned to companies within the system in the form of dividends and interest on securities owned. Funded debt in the hands of the public was reduced nearly $30,000,000 during 1941.

Expenditures for Construction and Maintenance Planned in 1942

(*Continued from page 545*)

In addition to the capital sums that will be expended for the extension and alteration of buildings, particularly enginehouses, shops, icing facilities, freight houses, warehouses, pier houses and other types that affect directly the handling of military traffic, to remove restrictions to this traffic by reason of inadequate facilities, other buildings of ample size will be modernized to remove similar restrictions imposed by obsolete arrangement, unsuitable floors, obsolete doors, ventilation, heating, lighting, plumbing and other facilities. Again, with the added passenger traffic that is gravitating to the railways as a result of the limitations placed on new automobiles and rubber tires, it will also be necessary to do a much larger amount of modernization and the replacement of obsolete facilities in passenger stations than has been done for more than 20 years.

When maintenance officers have been asked about deferred maintenance during the last three or four years, most of them have been reluctant to admit that any remains on their roads, except with respect to buildings, although some have added the painting of bridges. In replying to this question this year, one officer desired to make it clear that there is no deferred maintenance of any structure or facility on his road to the extent that a hazard is created. Another objected to the term on the ground that his road is carrying forward a substantial program of maintenance covering all structures and equipment, on a scale that prevents deferred maintenance. It is of interest, therefore, that more roads than in any previous year reported that they have wiped out all deferred maintenance except on buildings and the painting of bridges, and some of them expect to complete the latter by the end of this year.

In reply to a question whether the current program provides for taking up any deferred maintenance on tracks, bridges, buildings or other facilities, several officers replied that despite sharply increased budgets, they do not expect to do more than offset the current wear and tear caused by increased traffic and shortened schedules. One officer said that even the increased amount of rail he expects to lay and the additional ties that he will apply, will not put him ahead on these items, since they will not more than make good increased wear on the track as a whole.

An outstanding feature of the maintenance programs, that has been alluded to several times, is the amount of work equipment to be purchased in 1942. Despite the large and increasing purchases of power machines and tools that were bought annually from 1935 to and including 1940, the purchases of this equipment in 1941

reached the record-breaking total of 8,007 units, exceeding by 50 per cent the number purchased in 1940, up to then the year of largest purchases. Yet the budgets for 1942 provide for almost as many units as were purchased last year, except "highway" equipment, which is almost unobtainable. These prospective purchases provide clear indication of the increased amount of work that will be undertaken during the year.

While none of the officers who assisted in this study expressed any doubt of a continuation of traffic at its present or at a higher level, with characteristic caution several of them emphasized that their programs have been based on the ability of the railways to obtain equipment and materials. In fact, several officers took so pessimistic a view of this possibility that they made drastic reductions in the plans which they had prepared previously for work equipment and, in some instances, covering the larger fields of both construction and maintenance. Others, more optimistic, said that the plans they were presenting were the minimum that could be accepted without injuring their ability to handle the business that is now moving over their lines, and that if traffic continues to expand, they will be compelled by necessity to expand the work they are now contemplating.

As one officer remarked, the railways are so completely integrated with the military effort we are making that they cannot be considered apart from it. Dependable transportation is just as essential in war as men and munitions. No purpose can be served by allocating all materials to war production, thereby making it impossible for the railways to keep the transportation machine in good repair. If we are going to win this war, raw materials must be moved to the factory and the finished products to the front with complete regularity. If the railways are not allowed to obtain the materials and equipment they require to keep traffic moving regularly and dependably, it will be useless to concentrate intensively on other features of the national program.

On the whole, engineering officers are confident of the future of both maintenance and construction. They view their part in the all-out war effort as essential and are entirely willing to accept and discharge the responsibilities which their part in the program imposes upon them. They are, therefore, looking forward with enthusiasm to the busiest year they have had in more than a decade.

A Revolution—In Railroad Grading Equipment and Methods

(*Continued from page 541*)

is being used extensively for clearing up slides, loading material to fill washouts, in ballast pit operations and for many other classes of work. And in mentioning slides, at least one road has found the powerful tractor-bulldozer, with its ability to cut into the work at any point and to push debris in any direction, to be one of the most effective units of equipment available for this class of work, as well as for filling in sections of washed-out roadbed. Furthermore, this road has found this equipment invaluable at derailments for hauling damaged equipment clear of the track, for piling lading, for smoothing up the roadbed, for moving equipment and materials into position where they can be loaded out later with cranes and derricks, and, where necessary, for grading for temporary shoo-fly tracks.

In addition to all of these various uses of the crawler tractor as a power unit in grading and allied operations, at least one road has equipped a tractor with a front-end boom and has employed it effectively for excavating for bridge footings and for driving sheet piling. Another road has equipped one of its tractors with a power earth auger and is employing it effectively for digging holes for setting fence posts and telegraph, telephone and signal-line poles.

That the use of off-track grading equipment is proving highly economical in reducing construction and maintenance costs is evidenced in reports from many of those roads that have employed it, these reduced costs being as small as one-tenth former costs in some cases. One road reports that, employing its off-track equipment on line-change projects, 55,500 cu. yd. of material were handled at an average, all-inclusive, cost of 5.6 cents per cubic yard. Another road reports that, in a wide variety of grading operations, it handled a total of 55,260 cu. yd. of earth and rock at an out-of-pocket cost ranging from 3.6 to 5.2 cents per cubic yard, and averaging 4.7 cents per cubic yard. This same road, employing its draglines, bulldozers, trailbuilders and front-end loaders, completed approximately 127 miles of bank-widening in 1937, 1939 and 1940, handling approximately 189,000 cu. yd. of material at an average cost, exclusive of interest on the investment in the equipment and depreciation, of 2.15 cents per cubic yard.

Another case is cited of heavy cut ditching with an overhead loader, involving the removal of more than 15,000 cu. yd. of material and hauls up to 1,000 ft., at a cost of 6.8 cents per cubic yard, and of still another line change project involving more than 25,000 cu. yd. of excavation carried out with tractors, carrying-type scrapers and bulldozers, at an average out-of-pocket cost of 7.3 cents per cubic yard. On still another project, involving the removal of approximately 24,000 cu. yd. of earth and shale from a high bluff, and hauls in excess of 1,000 ft., the work, employing a 1-yd. crawler-mounted shovel and three or four 3-yd. trucks, was done at an average cost of 31.5 cents a yard, 48.5 cents less per cubic yard than the lowest contract bid price received for this work.

But low unit costs are only one of the many advantages that are being found in present-day off-track grading equipment, although many of the other advantages reflect themselves in the lower costs being achieved. This equipment works entirely clear of the track, without interference to itself by traffic, and without interfering with traffic, the latter factor having become of increasing importance in recent years with higher train speeds and streamlined schedules, and now assuming paramount importance in view of the peak war traffic being handled by the railroads, which must not be delayed.

To these advantages is that of the large savings over former methods in the number of work trains necessary to carry out essential maintenance of way work, and in work-train expense, one road, in the latter regard, pointing out that, largely as the result of the intensive use of its off-track equipment, it has been effecting a saving in work-train expense of more than one quarter million dollars a year over 1937 costs. Important as is this factor of economy at any time, of still greater importance at the moment, and, unquestionably, for the duration of the war, is the release for military, war production and civil traffic of the hundreds of cars and locomotives that must otherwise be employed in work-train service. Still another important factor urging the use of modern grading equipment in the days ahead, when the railways are certain to face serious labor shortages, is the large labor-saving feature inherent in this equipment, releasing many men for other essential maintenance operations.

Communications and Books . . .

Locomotive Cyclopedia. 1941 edition.—Compiled and edited by Roy V. Wright and Robert C. Augur under the supervision of an Advisory Committee of the Association of American Railroads, Mechanical Division. Published by the Simmons-Boardman Publishing Corporation, 30 Church street, New York. 1,312 pages, 9 in. by 12 in. About 4,000 illustrations. Price, $5, bound in fabrikoid.

Many new designs of locomotives (steam, electric, Diesel and industrial) and appliances developed since the publication of the 1938 edition of the Locomotive Cyclopedia are included in the eleventh, or 1941 edition. While the same general arrangement has been followed, the material has been made more readily accessible by a more clearly defined division of sections and a somewhat altered arrangement. The list of contents by sections and subdivisions and the alphabetical index to locomotive parts have been improved, and on the first page of each section appears a summary of its contents. A revision has also been made in the figure numbers for the illustrations. While in the maintenance and operation field improvements in shops and engine terminals since 1938 have not been extensive, the section on Locomotive Shops and Engine Terminals has been revised and a chapter on welding and cutting added.

Contributions to the Metallurgy of Steel. Booklets Nos. 1 to 5, inclusive. American Iron and Steel Institute, 350 Fifth avenue, New York. Nos. 1 to 4, 25 cents each; No. 5, 50 cents.

The five booklets which constitute the series of Contributions to the Metallurgy of Steel are, respectively, on Possible Substitutes for Nickel Steels; Direct Consumption of Aluminum in the Steel Industry; Problems Involved in the Conservation of Manganese; Possible Substitutes for Zinc Coatings on Steel, and Possible Alternates for Nickel, Chromium and Chromium-Nickel Constructional Alloy Steels. The report contained in Booklet No. 1 on Possible Substitutes for Nickel Steels, issued in May, 1941, deals only with constructional steels containing not more than the following percentages of the given elements: chromium, 1.50; nickel, 5.25; molybdenum, 0.75; manganese, 2; silicon, 2; and vanadium, 0.20. Part II deals with carburizing steels and Part III with Thorough-Hardening Steels. Booklet No. 5—Possible Alternates for Nickel, Chromium and Chromium-Nickel Constructional Alloy Steels—was recently prepared at the request of O. P. M. It gives details of four completely new series of alloy steels designed by a group of metallurgists from technical committees of the Institute, the S. A. E., and from alloy manufacturing companies. They embrace a series of carbon-molybdenum steels, manganese-molybdenum steels, low chromium-molybdenum and low nickel-chromium-molybdenum steels. These possible alternates are confined to constructional alloy steels containing not more than the following percentages of the following elements: nickel, 5.25; chromium, 3.99; manganese, 2; silicon, 2.25; vanadium, 0.25; and molybdenum, 1. They do not embrace the following types of steel: low-alloy high-tensile steels which are furnished as flat rolled products and which require no heat treatment; stainless steels or irons such as the high chromium or chromium-nickel types; medium chromium (2 to 10 per cent chromium) steels which sometimes contain other elements and which are used to resist scaling at elevated temperatures; or any class of tool steel.

"THUMBNAIL" BIOGRAPHICAL SKETCHES of employees are a recent feature of the public timetables distributed by the Boston & Maine and Maine Central, respectively. Headed "Know The Folks Who Serve You," each sketch contains a picture of the employee, a description of his or her work and facts as to length of service. Employees are selected for mention by order of seniority in the different classes of service. The current timetable of the B. & M. introduces the information clerk at North station, Boston, Mass., while that of the Me. C., the chief telephone operator at the Portland, Me., general office.

Messages for Passengers

BUFFALO, N. Y.

TO THE EDITOR:

Only one station that I know of has a board on which are posted names of arriving passengers for whom messages have been left—Chicago's Union Station. The more nearly typical situation is that messages can be left at any of two or three places.

May I suggest that more large terminals install a board for this purpose at some convenient point—perhaps the arrival board—and concentrate such messages in one spot?

WILLIAM C. KESSEL.

* * *

NEW YORK, ONTARIO AND WESTERN RAILWAY

Frederick E. Lyford, Trustee

Office of Superintendent Car Service

ALL OUT?

Are ALL the inbound loads OUT of the Yard and spotted on the unloading track, so the consignees can get ALL the freight OUT of them today?

Are ALL the empties OUT of the unloading tracks and made up to move today?

Are ALL of the outbound loads OUT of the loading tracks and ready to move?

Are ALL the surplus empties OUT of the yard and moving in home-route or to points where more loads await them?

Is ALL that Company material OUT of those serviceable cars today?

Are ALL those cripples repaired and ordered OUT today for service?

Are ALL instructions about efficient car handling OUT to all your men?

Getting them ALL OUT for Victory is better than losing the war and being ALL IN from defeat.

T. B. Girard
Supt. Car Service

Middletown, N. Y.

NEWS

Hollar Heads ODT Material Section

P.R.R. stores executive, recently with A.A.R., is successor to Colonel C. D. Young

Philip A. Hollar, special representative of the Operations and Maintenance Department of the Association of American Railroads and former assistant stores manager of the Pennsylvania, has been appointed acting director of the Office of Defense Transportation's Section of Materials and Equipment. He succeeds Colonel Charles D. Young whose call to active duty with the Army was noted in the *Railway Age* of March 7, page 504.

"My great regret in accepting Colonel Young's resignation," said ODT Director Joseph B. Eastman in his announcement, "has been tempered by the knowledge that his service with the United States Army will be as distinguished as was his service with the Office of Defense Transportation. I have been fortunate in being able to obtain the services of an able successor in Mr. Hollar."

A photograph of Mr. Hollar and a sketch of his railroad career were published in the *Railway Age* of February 21, page 431. At the A.A.R. he functioned as an assistant to Vice-President C. H. Buford, handling with government agencies and builders matters arising in connection with the material requirements of the railroads. Also, Mr. Hollar directed the preparation of railroad estimates and the assembly of data for presentation to ODT and the War Production Board, and he represented Mr. Buford at committee meetings and conferences relating to materials and equipment. Along with the Hollar appointment, Director Eastman also announced the appointments of Carroll W. Brown as assistant to the Director of the Materials and Equipment Section; and of eight consultants who will advise Mr. Hollar on technical matters pertaining to materials and equipment for various branches of the transportation industry. Mr. Brown served on the staff of the Federal Coordinator of Transportation as assistant director of the Section of Property and Equipment, and he has recently been employed as an equipment engineer on construction work at the Ravenna, Ohio, ordnance plant.

The eight consultants and the matters on which they will advise are as follows: F. H. Hardin, president of the Association of Manufacturers of Chilled Car Wheels—railroad freight, passenger, and all other types of cars; J. G. Bower, formerly Eastern representative of the Buckeye Steel Castings Company — castings and miscellaneous items required in rail transportation, manufacture and maintenance; Charles T. Ripley, chief engineer, Technical Board of the Wrought Steel Wheel Industry—steam, Diesel, and electric locomotives; H. L. Hamilton, manager of the Electro-Motive Division of the General Motors Corporation—Diesel engines for railroad propulsion equipment; Irving B. Babcock, president and general manager of the General Motors Truck Corporation—buses, trucks, taxicabs, and replacement parts; Harold C. Davis, vice-president of Consolidated Motor Lines, Inc.—equipment and supplies for maintenance of buses and trucks; Robert F. Black, president of the White Motor Company—equipment on which production has been suspended, including buses, trucks, fire-fighting apparatus, road work equipment, and work equipment for public utilities and communications companies; A. L. Viles, president of the Rubber Manufacturers Association, Inc., and chairman of the buying committee of the Rubber Reserve Company, affiliate of the Reconstruction Finance Corporation—rubber products, including tires, tubes, insulated wire, and belting and other mechanical rubber goods.

House Committee Approves Lea Land-Grant Repealer

The House committee on interstate and foreign commerce on March 11 voted to report favorably the bill introduced by Chairman Lea of that committee for the purpose of repealing remaining provisions of the land-grant-rate law. The committee hearings on the measure (H. R. 6156) were reported in the *Railway Age* of February 28, page 449.

Pullman Safety Record Best Since 1927

Despite an extra load of 2,000,000 troops carried last year, the 1941 employee safety record of the Pullman Company was one of the lowest since 1927. The casualty rate was 1.83 in 1941 or two per cent less than in 1940, although 4,000,000 more man-hours were worked. The winner of the inter-zone competition was the Philadelphia-Northern zone with 0.63 lost time accidents for each 1,000,000 man-hours worked. In the contest for repair shops, the Calumet (Chicago) shops won the award with a rate of 1.11.

Senate Probers Consider "Vans"

Milk of human kindness creeps into comment on qualities of Cleveland brothers

Senator Wheeler's interstate commerce subcommittee which has been studying railroad holding company financing during the past few years has made available this week Parts 3 and 4 of a four-volume study entitled, "The Van Sweringen Corporate System." The conclusions of the study are contained in Part 4 and outline in considerable detail the views which the subcommittee holds regarding the operations of the Van Sweringen brothers in creating their railroad empire during the decade of the 'Twenties.

Concerning the Van Sweringens' intentions toward the railroads which came under their control, the report has the following to say:

"The general conclusion is that the Van Sweringens' aim was to run their railroads well and to make them financially successful. As long as it was compatible with their other interests the brothers encouraged efficient and sound management of their carriers. However, the railroads were only one part of the Van Sweringen set-up and, as their system grew, the holding companies at the top became the center of their empire. As a result, the railroads became subservient to the necessities and demands of a holding company system. Railroad treasuries were depleted, improvident dividends were declared, and in the end the railroads were subordinated to the interest of a too complicated Van Sweringen corporate system. The railroads, although a public utility, came more and more to be run with an eye to Van Sweringen needs."

Considerable discussion has arisen from time to time as to the ability of the Van Sweringens in the field of railroading.

The subcommittee's views on this matter are summed up in the following words:

"Not only did the brothers have the promoters' gift for seeing the future with the vividness and clarity of the present, but they had a definite creative facility. The Shaker Heights development and the Terminal project were plainly not the work of commonplace men. Nor could untalented men have procured the support to make such visions reality. In much the same way the Van Sweringens' railroad empire could not have been called into being had

not the brothers possessed an extraordinary ability for planning on a large scale, and for persuading others to accept the reasonableness of those plans."

"Considered as actors in a play," concludes the report, "the Van Sweringens enjoyed parts of increasing importance until by the mid-twenties they had emerged as featured players if not principals in the performance. From young businessmen with interests in Cleveland alone, they had become magnates on a national scale, included in a much-advertised list of fifty-odd persons who were described as 'ruling the country.' It was a list including such names as John D. Rockefeller, J. P. Morgan, and the Du Ponts; and though published after the brothers had begun their decline, marked in some ways the high point of the Van Sweringen arc. In the earlier phase of their drama the brothers were the traditional poor boys making their way in the world. It was a success story with the most advanced trimmings. There were stock brokers, trust indentures, Wall Street banking firms, and the general accoutrements of finance. The conclusion of this happy play came sometime in the summer of 1929 with the Van Sweringen power and fortune at their greatest. The brothers controlled or were able to control twenty-odd-thousand miles of railroad. They had remade Cleveland in their own likeness and were adding a new set of buildings to their terminal project. They had become important stock exchange figures, dealing in millions of shares. Their personal fortune had swollen until it was more than a hundred and twenty millions of dollars.

"The break between this phase and the brothers' decline was sharp when it came. The price of Alleghany common stock fell away; the entire market was shaken to its foundations. Real estate values disappeared. The brilliant projects of one spring became the ruinous mistakes of the next. Thereafter the Van Sweringens lived under an almost constant pressure of debts and financial crises. They died, leaving 70 millions of personal debts and a tangle of financial-legal debris that has not yet been cleared away.

"Writing now, 1941, four years after O. P. Van Sweringen's death, five years after M. J.'s, it seems unlikely that the brothers' career will be duplicated. The use of the holding company in the railroad field has been inhibited and legislative reforms affecting the securities markets have made public financing of the Van Sweringens' type of enterprise improbable.

"One of the principal problems raised by the brothers' career, however, remains. The limiting of concentrations of economic power has yet to be dealt with in any effective way. The Sherman Act, the Clayton Act, and the statutes under which the Interstate Commerce Commission operates did not curb the inordinate growth of Van Sweringen power and the creation of a great corporate system that could be passed easily from the Van Sweringens to the Ball interests, from them to Messrs. Young and Kirby. The control of the national economy should not be allowed to become the prize of a few by virtue of popular default."

43 Per Cent of New York's Produce Moves by Truck

Railroads handled only 51 per cent of the fruits and vegetables reaching New York City markets in 1941—43 per cent of receipts moving by truck and 6 per cent by water. This information is made available in the March 10 Bulletin of the A. A. R. Eastern Region Competitive Research Office, 30 Vesey street, New York, which analyzes a report of the U. S. Department of Agriculture from the standpoint of railroad traffic.

The railroads' percentage share of the New York metropolitan produce business was greater in 1941 than in 1940—because droughts hit nearby producing areas which are largely dominated by the trucks, and shifted the business to more distant origins where the longer haul gave the railroads a better opportunity to compete. The transfer of trucks from farm products to better-paying defense traffic in the latter part of the year also tended to divert to the railroads a larger share of the vegetable movement than they would otherwise have enjoyed.

Practically all of the garden-truck coming to New York from Delaware and Maryland (150 or more miles away) moves by truck. Even as far away as South Carolina (minimum haul about 650 miles), the trucks still get about 50 per cent of the business.

Would Take Buses Off Rail Routes

Representative Voorhis, Democrat of California, made the suggestion in the House on March 10 that long-haul buses paralleling transcontinental rail lines should be diverted from these routes and used to haul workers in defense industries to and from their work.

Uniform Bill of Lading Proceeding Reopened

Acting upon the petition of the National Industrial Traffic League, the Interstate Commerce Commission has reopened the No. 4844 proceeding involving domestic bills of lading. The reopening is with a view to prescribing a uniform domestic bill of lading for common use by railroads and motor carriers. No date has yet been set for hearings.

Appointments to ODT's Division of Local Transport

W. S. Rainville, Jr., director of the Research Department of New Orleans Public Service, Inc., has been appointed assistant director of the Office of Defense Transportation's Division of Local Transport. While serving with ODT, Mr. Rainville will be on leave of absence from his present position.

Other Division of Local Transport appointments announced this week were that of Clewell Sykes, who will become chief of the Taxicab Section on March 16; and Felix Riefschneider, who has been named local transport engineer and assigned to field duty for the purpose of making local surveys and advising local transit company officers. Mr. Sykes is managing director of the Cab Research Bureau, Inc., Cleveland, Ohio; while Mr. Riefschneider was formerly assistant manager of the Transportation Department, Manila Electric Company, Manila, P. I.

OPA Appointment

Dewey C. Wayne has been appointed assistant director of the Office of Price Administration's Division of Transportation, which is headed by Dr. G. Lloyd Wilson, director also of the Office of Defense Transportation's Division of Rates. Mr. Wayne has been a member of the executive staff of the Middle Atlantic States Motor Carrier Conference, Inc., and he was formerly traffic manager of the American Short Line Railroad Association.

1941 Air Traffic

Domestic air lines in 1941 carried 3,768,892 revenue passengers, an increase of 38.16 per cent over the 2,727,820 carried in 1940, according to figures just made public by the Civil Aeronautics Administration of the Department of Commerce. Revenue passenger-miles flown were meanwhile up 31.54 per cent. Express carried last year totaled 19,209,671 lb., an increase of 53.6 per cent above 1940, while express pound-miles were up 51.1 per cent.

Car Ferry to Break Ice in Soo

The car ferry Sainte Marie, owned by the Pennsylvania, the New York Central and the Minneapolis, St. Paul & Sault Ste. Marie, will be loaned to the Coast Guard at the request of the government and will be used to break ice on the Great Lakes. The ferry will begin ice-breaking operations in the Sault Ste. Marie locks area on March 15 to speed war shipments of iron ore from northern ranges to eastern furnaces.

Brotherhoods Get Large Vote in North Shore Election

The Brotherhood of Locomotive Firemen and Enginemen, the Brotherhood of Railway Trainmen, the Brotherhood of Railway Telegraphers and the Hotel and Restaurant Employees International were chosen as bargaining agents for employees of the Chicago, North Shore & Milwaukee in an election conducted by the National Mediation Board on March 1 to determine whether these unions or the Amalgamated Association of Street, Electric Railway and Motor Coach Employees, which has been the bargaining agent for 20 years, should represent the employees on the North Shore.

Prior to the election, Amalgamated, which has a closed shop on the Chicago elevated system over which the North Shore enters Chicago, refused to participate in the North Shore craft elections and requested a rehearing of the case on the ground that the board had no right to break up a long-established union into component parts for election purposes and that the board's order unduly favored the brother-

hoods. The Board, on March 2, denied the petition of Amalgamated and it was indicated that Amalgamated will continue to exercise its rights on the elevated lines and that its crews will continue to operate North Shore trains within Chicago, as they have done since service was resumed on February 18.

Philadelphia Railroad Group Elects

The following officers were elected at a recent meeting of the Quaker City Railroad Association, Philadelphia, Pa.: President, J. M. Heath, freight claim agent, Lehigh Valley; First Vice-President, E. O. Choice, general agent, Chicago, Burlington & Quincy; Second Vice-President, William Wagner, Jr., Reading; Secretary, R. E. Sigman, freight representative, Baltimore & Ohio; and Treasurer, Walter Applegate, office of the vice-president (traffic), Pennsylvania.

R. F. & T. E. A. Appoints New Vice-President

At a combined Executive and Advisory Committee meeting of the Railway Fuel & Traveling Engineers' Association at the Hotel Sherman, Chicago, on March 9, W. R. Sugg, superintendent of fuel conservation and lubrication, of the Missouri Pacific, with headquarters at St. Louis, Mo., was appointed vice-president in place of J. A. Burke, supervisor of air brakes, Atchison, Topeka & Santa Fe, who passed away early in February, as announced elsewhere in this issue. Mr. Sugg was replaced on the Executive committee by G. B. Curtis, road foreman of engines, Richmond, Fredericksburg & Potomac, Richmond, Va.

Additional Features A. R. E. A. Annual Meeting Program

In addition to the program printed in the *Railway Age* of March 7, page 507, Andrew Stevenson, director of the Transportation and Farm Industries division of the War Production Board in charge of the allocation of critical materials to the railways, will address the annual meeting of the American Railway Engineering Association at the Palmer House, Chicago, at 11:30 on Tuesday morning, March 17, on what the railways may expect in maintenance materials. On Wednesday evening it is expected that an officer of the British railways will address the meeting on the damage experienced by the British railways from bombing and the measures adopted to minimize and repair this damage.

Armstrong Cork Helps Car Program

The Armstrong Cork Company has requested wholesale distributors of its linoleum and felt-base floor coverings to accept a voluntary increase in the minimum carload weights of shipments to co-operate in the national car efficiency program. In a letter to distributors, the company's Sales department pointed out that although the carload minimum weight requirement for linoleum and felt-base floor covering is 30,000 lb. the company's Order department has been asked to adopt a program of reloasing cars with the maximum weight that can be carried, rather than the minimum weight as provided in the freight tariffs. The only exceptions to this plan will be made in the case of those few customers who receive shipments so infrequently that the shipment of maximum cars would result in a serious handicap to their operations.

The company also urged prompt unloading: "We strongly recommended that each wholesaler check his normal procedure on this point and take steps to reduce to an absolute minimum the interval between the arrival of his cars and their release to the railroad as empties. From the standpoint of the nation's wartime transportation problem, this sort of co-operation will have exactly the same effect as the building of new cars, which would require materials vitally for Army and Navy equipment."

The company's purchasing department also has requested all suppliers to ship materials loaded in maximum carload quantities and reports that as a result of a program launched early in 1941 to facilitate the unloading of freight cars, demurrage had virtually been eliminated at all of the company's 17 domestic factories.

Pacific Club Elects Officers

The Pacific Railway Club has elected the following officers for the ensuing year: President, Fred E. Geibel, superintendent of equipment of the Pacific Electric, Los Angeles, Cal.; vice-presidents, B. M. Brown, assistant general superintendent of motive power of the Southern Pacific, San Francisco; H. S. Wall, mechanical superintendent of the Atchison, Topeka & Santa Fe, San Francisco; and C. A. Veale, vice-president and general manager of the Northwestern Pacific, Sausalito; and treasurer, W. T. Richards, chief engineer of the Sacramento Northern, Sacramento. William S. Wollner, general baggage and ferry agent of the Northwestern Pacific, who has been the club's secretary during its entire existence, continues in that capacity.

How the War Affects C. P. R. Operations

How the changing movements of a war affect a railroad's traffic and organization is well illustrated by a recent review of operations on the Canadian Pacific by Sir Edward Beatty, president of the road, at Calgary, Alta. Sir Edward pointed out that timber shipments from British Columbia to the Atlantic Coast and other Eastern points, and diversion of much of the great mineral output of Consolidated Smelters at Tadanac, B. C., from Western to Eastern ports necessitates an extraordinarily long-haul movement, while mounting industrial and basic material output of the prairie regions and the needs of shipbuilding supply at the Pacific Coast, are adding to a similarly heavy westward movement.

At the same time, he said, new demands upon Canadian rail transportation are arising from United States plans of offense and defense in the Far North, and will be met. The Canadian Pacific is also extensively participating in this development with the use of its large air fleet in North Alberta and the Arctic. Military freight is being handled by air from Edmonton, Alta., on a scale the full magnitude of which cannot be disclosed. Present routes, carrying scheduled loads of mail, express and passengers to the Yukon, the Mackenzie river area, and the North Saskatchewan mining fields, are now being operated to capacity and additional aircraft are on order. Many of these services will also be extended beyond their present limits when feasible.

U. S. to Rehabilitate Brazilian Railroad

The Export-Import Bank has agreed to lend Brazil up to $14,000,000 for rehabilitation of the Victoria-Minas Railway, the opening up of iron mines in the Itabira region of the State of Minas Geraes and for the improvement of ore-loading facilities at the Port of Victoria, in the State of Espirito Santo, according to an announcement this week by Secretary of Commerce Jesse Jones.

The loan, said the announcement, is payable out of the proceeds of the production and transportation of iron ore to be purchased by the Metals Reserve Company and the British government. The arrangement, declared Mr. Jones, contemplates the acquisition of the Itabira mining properties and the Victoria-Minas Railway by the Brazilian government.

North Western Asks Court Aid to Permit Fare Increase

The Chicago & North Western, on March 10, filed a petition in the federal district court seeking an injunction to restrain the Illinois Commerce Commission and various Illinois and county officers from interfering with its plan to increase suburban fares 10 per cent, as authorized by the Interstate Commerce Commission, by enforcing an Illinois statute which prohibits passenger fares of more than two cents a mile. The petition said that the road faced the dilemma of either violating the laws of Congress or of being subject to prosecution under Illinois law.

Increased tariffs, which had been filed by 14 railroads to become effective on March 8, were suspended by the Commission until July 6 and hearings were scheduled to start on March 11. Twenty-two railroads are expected to testify at the hearings.

$400,000,000 Rivers and Harbors Bill Introduced

What he called a rivers and harbors authorizations bill "limited to those projects which have been considered of national defense value" has been introduced in the House of Representatives by Representative Dondero, Republican of Michigan. Mr. Dondero included the St. Lawrence seaway and power project in his bill (H. R. 6724), which would authorize 38 projects estimated to cost a total of $400,000,000, as compared with the authorizations totaling about a billion dollars in the pending bill which was reported favorably to the House from the committee on rivers and harbors.

Among the projects in the committee bill, which would not be authorized by the

Dondero bill, are the Tennessee-Tombigbee waterway, the Beaver-Mahoning project, and the Florida ship canal. Commenting on his proposal, Mr. Dondero recalled how President Roosevelt had vetoed a $110,000,000 rivers and harbors authorizations bill in 1940, adding that Congress has "no right to expect" that Mr. Roosevelt is now "going to look with favor upon a bill of $1,000,000,000."

Rail Labor Proposing Wartime Emergency Board

Railway labor leaders were at the White House last week with a proposal for the creation of a permanent fact-finding board which would function for the duration of the war in the investigation of railway labor disputes not settled by mediation or arbitration under the provisions of the Railway Labor Act. Discussing the proposal with President Roosevelt were T. C. Cashen, chairman of the Railway Labor Executives' Association, and B. M. Jewell, president of the Railway Employees Department, American Federation of Labor.

It is understood that labor desires in these times to avoid taking strike votes and setting up strike threats in order to get disputes referred to an emergency board. The idea is that the proposed permanent emergency board would be ready to take over disputes where mediation failed and arbitration had been rejected.

Troop and Passenger Trains Collide on Frisco

Four soldiers, a mail clerk, a porter and a fireman were killed and 28 persons were injured when a troop train, carrying 230 Camp Grant (Ill.) recruits, and a passenger train, the Will Rogers, met head-on eight miles east of Granby, Mo. on the St. Louis-San Francisco, on March 7. According to a statement by J. M. Kurn, president of the railroad, the accident was caused by the enginemen of both trains disregarding signals. The westbound troop train, consisting of two baggage cars and six coaches, failed to take a siding at Richie, four miles east of the accident. The first baggage car of this train overturned and the coach behind the second baggage car was telescoped. Most of those killed and injured were in this coach. The baggage car of the Will Rogers fell off a trestle on which the accident occurred, into a dry creek bed about 10 feet below. The second car overturned and the third left the rails but remained upright. Both locomotives remained upright on the rails.

Alaska Highway to Be Built

Approval by the United States and Canada of the construction of the Alaska International Highway was announced this week in Washington, D. C. by a special cabinet committee appointed by President Roosevelt for decision on this project. Headed by Secretary of the Interior Harold L. Ickes, the committee included Secretary of War Stimson and Secretary of the Navy Knox.

The announcement goes on to say that an immediate survey by the Army Engineers is going forward on the route tentatively approved, which is one of three routes which have been under consideration, but adds that the exact route has not been announced.

Meanwhile in the House of Representatives during discussion on the War Department civil appropriation bill, Representative Case, Republican of South Dakota, offered an amendment which would have appropriated $5,000,000 to carry out the construction of the highway. His amendment was ruled out of order on the ground that it was not germane to the bill under discussion since there was no evidence that the highway had actually been started.

Freight Car Loading

Revenue freight car loadings for the week ended March 7 totaled 770,697 cars, the Association of American Railroads announced on March 12. This was a decrease of 10,722 cars, or 1.4 per cent, below the preceding week, but an increase of 28,080 cars, or 3.8 per cent, above the corresponding week last year, and an increase of 150,101 cars, or 24.2 per cent, above to comparable 1940 week.

As reported in last week's issue, loadings of revenue freight for the week ended February 28 totaled 781,419 cars, and the summary for that week compiled by the Car Service Division, A. A. R., follows:

Revenue Freight Car Loading

For Week Ended Saturday, February 28

District	1942	1941	1940
Eastern	166,044	171,345	142,341
Allegheny	178,378	169,849	130,894
Pocahontas	51,136	52,408	44,986
Southern	125,442	115,703	100,246
Northwestern	88,034	86,784	74,530
Central Western	110,884	105,970	94,805
Southwestern	61,501	54,611	46,834
Total Western Districts	260,419	247,365	216,169
Total All Roads	781,419	756,670	634,636
Commodities			
Grain and grain products	37,351	34,058	35,323
Live stock	10,470	10,506	11,131
Coal	162,500	160,307	130,500
Coke	14,455	14,244	10,030
Forest products	45,328	40,743	32,269
Ore	12,853	12,182	10,082
Merchandise l.c.l.	143,542	159,365	149,550
Miscellaneous	354,920	325,265	255,751
February 28	781,419	756,670	634,636
February 21	774,595	678,523	595,383
February 14	782,699	721,176	608,237
February 7	784,060	710,196	627,429
January 31	815,567	714,354	657,830
Cumulative Total, 9 Weeks	6,981,046	6,320,974	5,681,250

Club Meetings

The Toronto (Ont.) Railway Club will hold its annual "Ladies' Night" at the Royal York hotel on Monday, March 23. Tickets should be secured from R. H. Burgess, assistant chief clerk, Canadian National.

The New England Railroad Club will hold its next meeting at the Hotel Touraine, Boston, Mass., on April 14. F. W. Collins, industrial commissioner, Canadian Pacific, will speak on the subject "The Contribution of a Railway in the Building of a Nation."

The Railway Club of Pittsburgh will hold its next meeting at the Fort Pitt hotel, Pittsburgh, Pa., on March 26, at 8 p. m. Ross Lefler, chairman, Allegheny County Defense Council, Pittsburgh, will present a paper entitled, "Activity Defense Council in Connection with Air Raids and Other Defense." Also planned for the evening is a moving sound picture in color, provided by the Great Northern, showing railroading and scenes in the Northwest country of salmon fishing, iron mining, etc.

January Accident Statistics

The Interstate Commerce Commission on March 10 made public its Bureau of Statistics' preliminary summary of steam railway accidents for January. The compilation, which is subject to revision, follows:

Item	Month of January 1942	1941
Number of train accidents	1,066	670
Number of casualties in train, train-service and nontrain accidents:		
Trespassers:		
Killed	116	113
Injured	105	116
Passengers on trains:		
(a) In train accidents*		
Killed	5	..
Injured	76	157
(b) In train-service accidents		
Killed	5	..
Injured	162	150
Travelers not on trains:		
Killed	1	..
Injured	67	74
Employees on duty:		
Killed	74	54
Injured	2,479	1,630
All other nontrespassers:**		
Killed	225	205
Injured	768	683
Total—All classes of persons:		
Killed	426	372
Injured	3,657	2,810

* Train accidents (mostly collisions and derailments) are distinguished from train-service accidents by the fact that the former cause damage of more than $150 to railway property.

** Casualties to "Other nontrespassers" happen chiefly at highway grade crossings. Total highway grade-crossing casualties *for all classes of persons, including both trespassers and nontrespassers,* were as follows:

Persons:		
Killed	210	193
Injured	606	487

Mediation Board Report on North Shore Election

The National Mediation Board last week made public its report of the recent election held in connection with the representation-of-employees dispute involving motormen employed by the Chicago, North Shore & Milwaukee. The Board has certified the Brotherhood of Locomotive Firemen & Enginemen on the basis of the results of the election wherein 104 of the 108 participating employees voted for the B. of L. F. & E. while only one voted for the Amalgamated Association of Street, Electric Railway and Motor Coach Employees of America.

With respect to the showing of the Amalgamated, however, the decision shows that that organization refused to participate in the election and requested that its name be omitted from the ballot. The Board declined to grant that request, "for the reason that it has uniformly placed on ballots . . . the name of the individual or organization representing the employees at the time the election was held, unless such representation had been relinquished."

In other recent elections, dining employees of the Boston & Maine chose the United Transport Service Employees of America; while patrolmen, including lieutenants and sergeants, in the Police Depart-

ment of the New York, New Haven & Hartford, chose the New York, New Haven & Hartford Railroad Patrolmen's Benevolent Association, Inc. Also, the Brotherhood of Railway Clerks has won the right to represent clerical, office, station and storehouse employees of the Lehigh & Hudson River and of the Georgia & Florida.

Eastman Tells Rail Shippers to Continue Normal Routing

Shippers using the railroads have been advised by Director Joseph B. Eastman of the Office of Defense Transportation to use normal channels in routing carload traffic, in order to avoid overburdening the most direct routes. The Eastman statement, issued March 6, came "in response to numerous inquiries from shippers."

"At the present time," said the ODT director, "there is no need for imposing any general restrictions upon shippers in the routing of carload traffic, and there is no reason why shippers should not follow their usual practice in routing such traffic; avoiding, of course, routes that are unduly circuitous or otherwise clearly wasteful. In times when expedition in traffic movement is a matter of particular concern, shippers naturally tend to concentrate their traffic over the shortest and most geographically direct routes. Such a tendency is quite likely to overburden these direct routes, increasing the difficulties of speedy movement. On the other hand, continued use of normal routes will tend to prevent undue pressure on the most direct routes, with the result that the general flow of traffic, instead of being retarded, in many cases actually will be accelerated."

Further Hearing on Contracts for Temperature-Control Services

Contracts entered by railroads and express companies for the provision of so-called protective service, i. e., temperature-control services for the protection of perishable freight against heat or cold, will be the subject of further Interstate Commerce Commission hearings before Examiner Sharp at Chicago on April 9. The further hearing is in the Ex Parte 137 proceeding which the commission instituted after it had obtained regulatory authority over the protective-service contracts in the Transportation Act of 1940.

The hearing, the notice said, "is for the purpose of receiving such evidence as may be appropriate with respect to the justness, reasonableness, and consistency with the public interest of the terms and charges stated in the contracts . . ." Carrier parties to such contracts are warned that the burden of proof is on them to show that the contracts are in harmony with principles set forth in the commissions report in the proceeding (see *Railway Age* of December 6, 1941, page 965).

Moreover, the notice says that "it is believed that no carrier can be adequately represented by an officer or other employee of the contracting car-line." Also, the commission has been informed that unit prices proposed in contracts between the Fruit Growers Express Company and carriers which are not joint owners of that car-line "are uniformly higher than the prices proposed for identical units of service to be performed by that car-line for its proprietary carriers." The notice added that "no data has been submitted in support of the reasonableness of different prices for these identical services"; and "it would appear to be desirable for the non-proprietary carriers which have contracts with the Fruit Growers Express Company to have their own representatives at the hearing."

Hood and Johnston Join ODT's Rail Transport Division

J. M. Hood, president of the American Short Line Railroad Association, and Charles E. Johnston, chairman of the Western Association of Railway Executives, have been appointed associate directors of the Division of Railway Transport, Office of Defense Transportation. Mr. Hood, maintaining headquarters at Washington, D. C., will be in charge of the Southern region; and Mr. Johnston, with headquarters at Chicago, will be in charge of the Western region where he will be assisted by James M. Baths, whose appointment as deputy associate director with headquarters at San Francisco, Calif., was noted in last week's issue. Both Mr. Hood and Mr. Johnston will retain their present position while serving also with ODT.

Two other appointments to the Division of Railway Transport were announced at the same time. Fred S. Keiser, traffic commissioner of the Duluth, Minn., Chamber of Commerce, has been appointed consultant to Associate Director Johnston, while H. H. Kiernan, former assistant regional director

Underwood & Underwood

J. M. Hood

for the Western region, Federal Co-ordinator of Transportation, has been appointed assistant to Director V. V. Boatner of the Division. Since 1936, Mr. Kiernan has been associated with the Gulf, Mobile & Ohio, and has engaged in independent railway analytical work.

Mr. Hood was born at Beach City, Ohio, October 30, 1891, and he entered railroad service in 1908 as a trackman for the Baltimore & Ohio. Shortly thereafter, he became an operator and agent for the same road, while from 1910 until 1912 he served with the Wheeling & Lake Erie as operator, dispatcher, and mechanical department clerk. In 1912, Mr. Hood became associated with the Akron, Canton & Youngstown, and remained with that road until 1935 when he became president of the Short Line Association. While with the A. C. &

C. E. Johnston

Y. he was from 1912 until 1914, chief clerk in the operating department; 1914 until 1918, assistant superintendent; 1918 until 1924, superintendent; 1924 until 1929, general superintendent; and from 1929 until 1935, vice-president in charge of operation.

Mr. Johnston was born October 30, 1881, at St. Elmo, Ill., and he entered railroad service in 1897 as office boy and call boy for the Chicago, Paducah & Memphis (now Chicago & Eastern Illinois). Later the same year he went with the St. Louis Southwestern where he remained for about a year, serving in turn chainman, rodman and transitman. In 1898, Mr. Johnston returned to the C. & E. I. and served in its engineering department until 1900 when he became assistant engineer, maintenance of way, for the St. Louis-San Francisco. He remained in that position until 1906, except for a brief period in 1903 when he was engineer on location and construction for the Missouri Pacific. In 1906, Mr. Johnston joined the engineering department of the Kansas City Southern; and he remained with that road until 1939, serving as its chief engineer from 1911 until 1917, general manager from 1917 until 1924, vice-president and general manager from 1924 through 1927, and president from 1928 through 1938. Since 1939 Mr. Johnston has been chairman of the Western Association of Railway Executives and commissioner for the Western railroads.

Requests Funds for Soo Lock

President Roosevelt has signed H. R. 6446 which provides, among other things, an authorization for the construction of a new lock and auxiliary works at Sault Ste.

Marie on the St. Marys River, Mich. At the same time the President has sent to Speaker of the House of Representatives a budget request for an appropriation of $9,300,000 for the immediate beginning of construction of the new lock, which has been termed "vital to the prosecution of the war." The letter from Budget Director Smith to the President declares that "its construction will materially improve and safeguard the transportation of iron ore from the Great Lakes region to steel industries engaged in the manufacture of munitions of war."

Meanwhile, Chairman Mansfield of the House committee on rivers and harbors inserted in the appendix to the March 9 Congressional Record a letter which he had received from Judge R. V. Fletcher, vice-president of the Association of American Railroads. Judge Fletcher asserted that railroad interests were in no way responsible for recent allegations to the effect that Mr. Mansfield was holding up legislation authorizing the Soo lock in order to force consideration of the project as a part of the pending billion-dollar rivers and harbors bill.

F. E. Cheshire Pays Tribute to Supply Companies

In discussing "The Modern Freight Car" at the December 9 meeting of the Car Foremen's Association of Chicago, F. E. Cheshire, assistant superintendent of the car department of the Missouri Pacific, traced the development of freight cars from the earliest types to the efficient modern units and emphasized the vital part which railway car men have played in perfecting design details, improving maintenance practices and securing increased utilization of freight car equipment. Regarding the contribution of railway equipment and supply companies to this important work, Mr. Cheshire, who is president of the Car Department Officers' Association and past president of the Car Department Association of St. Louis, said:

"Contributing the engineering genius and service assistance of their organizations, the supply companies have marched side by side, through good times and bad, with the builders and operators of freight cars. They have produced new materials, new devices and improvement in existing appliances. The modern draft gear, the coupler, the air brake, doors and fixtures, the modern car wheel, improved trucks, the metal running board, cars with loading devices to simplify and expedite loading, stowing and unloading; and numerous other integral parts of the American freight car stand as monuments to railway supply companies and their contribution to the modern freight car."

Monthly Review of I. C. C. Bureau of Statistics

Appraising the high percentage increases in railway revenues and traffic for January, the latest issue of the Bureau of Statistics' "Monthly Comment on Transportation Statistics" suggests that consideration should be given to the fact that for the first four months of 1941 the level of railway traffic and revenue was below that prevailing later in that year," and hence "unless traffic of 1942 rises to a higher level than that prevailing in January, after seasonal adjustment, the percentage of increase, 1942 over 1941, should decline somewhat."

As the Bureau noted, the railways for the remainder of the year will have the benefit of the Ex Parte 148 passenger and freight rate increases, estimated at $249,000,000 on the basis of 1941 traffic. "The actual increase," it added, "will be greater to the extent of the increase in business over the 1941 level, and will be decreased to the extent of rate concessions to meet competition."

January freight revenues were 26.8 per cent above those of January, 1941, while carloadings were up only 12 per cent. This "wide divergence," the Bureau suggested, "is likely to grow less as the year 1942 advances; that is, after traffic composition, load per car, and length of haul resulting from defense activity appear on both sides of the comparison." Noting that the January operating ratio was 72.6 per cent, the Bureau thought it might be of interest to compare that figure with the January operation ratios of the World War I era. The latter were: 1916, 70.4; 1917, 71.6; 1918, 95.1; and 1919, 90.8. "The higher ratios prevailing in 1918 and 1919," the Bureau said, "reflect the more rapid inflation in prices and wages and other costs of operation than in the present war period, without immediate and corresponding increases in rates and fares."

Commenting on railway net income, the Bureau calculated that the 1941 figure for Class I roads ($501,650,867) "is equal to a return of 6.1 per cent on the total common and preferred stock outstanding, and to 4.7 per cent on the combined stock and corporate surplus as of December 31, 1940." This net income, it explained, "is after deduction from gross income of all fixed and contingent charges as accrued by the railways, some of which are undergoing reorganization."

Ask I. C. C. to Set Aside New York Rate Orders

Eleven railroads serving New York state and New York City have asked the Interstate Commerce Commission to set aside recent orders of the Public Service Commission of New York and the Transit Commission of New York denying them the right to increase their intrastate passenger fares by 10 per cent in line with recent increases authorized by the commission for interstate passenger travel. The roads involved in the request are the Baltimore & Ohio; Boston & Maine; Delaware & Hudson; Delaware, Lackawanna & Western; Erie; Lehigh Valley; Long Island; New York Central; New York, New Haven & Hartford; Pennsylvania; and the Staten Island Rapid Transit.

The petition, asking that the commission institute an investigation under section 13 of the Interstate Commerce Act, contends that the intrastate fares cause "unjust discrimination against interstate and foreign commerce." The petitioners request that the commission issue an order prescribing the present rates and fares of the companies concerned, increased by 10 per cent, for application in intrastate commutation traffic in the state of New York which will remove the alleged "advantage, preference, prejudice, and discrimination."

As was reported in the *Railway Age* of February 28, page 461, the Public Service Commission (body having statewide jurisdiction) denied the railroads' applications to increase commutation fares in the state on February 24, at which time the commission declared that the proper method of appeal is in the courts and not the I. C. C. The New York Transit Commission (body having city-wide jurisdiction) suspended increased fares which were to be effective March 1 for 120 days from February 26 and obtained a permanent injunction against their application from Supreme Court (state) Justice S. A. Hofstadter on March 6.

Price Agreements with OPA Don't Violate Anti-Trust Laws

Any danger that agreements made by industry members with the Office of Price Administration pursuant to the Emergency Price Control Act of 1942 would violate anti-trust laws is removed by the terms of the act, Price Administrator Leon Henderson stated this week.

"Such agreements are now authorized by act of Congress," Mr. Henderson said. "The Emergency Price Control Act of 1942, in Section 5, specifically provides that ' . . . the Administrator is authorized . . . to enter into voluntary arrangements or agreements with any . . . persons, groups, or associations relating to the fixing of maximum prices, the issuance of other regulations or orders, or the other purposes of this Act . . . '

"The Office of Price Administration may thus proceed, under its own power, to complete agreements which will prevent undue price increases. Formerly we had acted in accordance with letters from the Attorney General granting permission to make such agreements. Under the new statutory procedure the Attorney General is furnished with a copy of the agreement after it has been entered into. While we shall continue to work in close collaboration with the Department of Justice, the protection afforded to our voluntary agreements with industry is now statutory."

Mr. Henderson further stated that OPA will continue to rely upon such voluntary agreements, "since the wholehearted cooperation of industry has been and will be an important aid toward the type of price control essential to our war effort."

Railroads Should Stock Coal

The railroads, as well as other industries and the public, can and should stock coal, according to R. E. Howe, president of Appalachian Coals, Inc. who spoke at a luncheon of the Columbus Chamber of Commerce and the Columbus Transportation Club, held in conjunction with the sixty-fourth regular meeting of the Ohio Valley Transportation Advisory Board at Columbus, Ohio on March 10. The docket of the meeting centered around transportation in war time and also included a discussion of the Perfect Shipping Month campaign in the Ohio Valley. Carloadings in the Ohio Valley during the second quarter of 1942, according to forecasts made by

commodity committees, will increase 33.8 per cent compared with the same period last year.

"The biennial agreement with mine workers," Mr. Rowe said, "is taken care of for some time to come. Coal producers are effectively working with the Federal government's regulatory and other coal bureaus and commissions; co-operative sales agencies are taking the place of the old lecherous marketing methods. However, there are certain requirements ahead which we must not under-estimate and for which we must all be prepared. Transportation facilities must continue to be adequate. Civilian and war industry demands for coal must be coordinated to avoid peak demands on transportation and seasonal slump in coal production. The same high priority ratings for both railroads and the coal industry must be maintained. Materials and equipment are of vital and first importance if we meet the demands of ever-increasing traffic and fuel. We must hold our trained men. Enough men—and the right men—must be left in our industries to maintain continuous, safe and efficient operation.

"Some railroads now have fifty days storage—some twenty—and they average about forty days. The experience of the railroads themselves in past crises must decide how much coal should be carried in storage, rather than our personal judgment in the matter."

Violence Flares in T. P. & W. Strike

Violence flared again on March 10 in the Toledo, Peoria & Western strike when members of the CIO and AFL unions joined the railroad brotherhood's picket line and prevented a freight train from leaving on schedule. A fireman was taken to a hospital suffering from fractured ribs, loosened teeth and head cuts.

Earlier on the same day Federal Judge J. Leroy Adair denied a petition by the brotherhoods asking that no further injunctive relief be given the railroad. In making the motion the brotherhoods accused the railroads of violating the Norris-La Guardia Labor Act and becoming, therefore, ineligible for court relief. It was filed as a preliminary to the trial of five men charged with violence and following failure of the National Mediation Board to bring about arbitration. The motion contended that "a party who himself defies the authority of the government by refusing to come within the provisions of the law which affords complete relief, should not be permitted to invoke the protection of any arm of the government while continuing acts of defiance of governmental authority."

As reported in the *Railway Age* of March 7, the National War Labor Board, on March 2, voted to order the road to arbitrate the case under Section 8 of the Railway Labor Act which provides that the arbitration shall be carried out under the auspices of the National Mediation Board. John F. Murray, representative of the National Mediation Board, attempted to bring about arbitration at Peoria, Ill. last week but representatives of the railroad did not put in an appearance.

According to George P. McNear, president of the railroad, he has never flatly refused to arbitrate but has declined to arbitrate under certain circumstances and until the issues are more clearly defined. He also complained that mediators so far have seemed more like labor partisans than umpires. "They even tried," he said, "to trap our men into going into a room in a hotel in Peoria which is being used as a brotherhood headquarters but we were not caught in that trap."

On March 11, "sympathy pickets" evicted a company guard from his shanty, tipped it into a creek and set it afire. Pickets also gathered at East Peoria, halted trains of the Chicago, Burlington & Quincy, which were about to be transferred to the T. P. & W., and forced them to return to their own yards.

Meanwhile, Senator Mead, Democrat of New York, has inserted in the Congressional Record of March 10, a memorandum, written from the labor viewpoint, setting out what purport to be the "facts" regarding the controversy on the property.

Rate-Increase Tariffs Effective March 18

Railroad tariffs publishing the Ex Parte 148 freight-rate increases were filed with the Interstate Commerce Commission on March 7 with an effective date of March 18. As noted in the *Railway Age* of March 7, page 484, where the Ex Parte 148 report was reviewed, the commission gave the necessary relief to permit the publication of the authorized increases on 10-days notice.

Similar relief was also granted last week to motor carriers, permitting them to publish on 10-days notice tariffs bringing their rates into line with the railroad adjustment. The railroads followed their usual plan in general rate cases of publishing master tariffs and connecting-link supplements; and a similar procedure was adopted by American Trucking Associations, Inc., with respect to its tariffs proposing motor-rate increases, also effective March 18.

The motor carrier rates were not in issue in Ex Parte 148, but A. T. A. supported the railroad petition and indicated that truckers represented by it would seek increases similar to those authorized for railroads. Commenting on that A. T. A. presentation, the commission's Ex Parte 148 report said: "Since passage of the Motor Carrier Act, 1935, these motor carriers have tended to adopt the rail basis of rates, particularly in connection with less-truckload quantities, and they contend that the existing level of motor carrier rates is unreasonably low under present conditions. Few of the rates of the motor carriers are held by maximum rate orders, and except where waiver of tariff rules or short notice is sought they need only file tariffs making desired increases. By submitting evidence in this proceeding, they hope to avoid suspension of such tariffs as may be filed by motor carriers."

Meanwhile, the committee of traffic executives which the railroads have created for the purpose of passing upon requests for readjustment of rates will hold its first meeting at the Hotel Pennsylvania, New York, on March 12 and 13. At that two-day meeting the committee will perfect its organization and plan of procedure, and also hear G. Lloyd Wilson, director of the Office of Price Administration's Transportation Division and of the Office of Defense Transportation's Division of Rates, on readjustments OPA thinks should be made.

I. C. C. Service Order on Cars for Livestock Shipments

Service Order No. 71 has been issued by the Interstate Commerce Commission to suspend what the commission regards under present emergency war conditions as equipment-wasting provisions of tariffs relating to the furnishing of cars for livestock shipments. The order becomes effective April 1.

The tariff provisions involved are those under which carriers furnish follow-lot cars; and those under which the carriers furnish two or more single-deck cars for a double-deck car or cars ordered, two or more smaller cars for one or more larger car or cars ordered, and a larger car for a smaller car ordered. They are suspended to the extent that no carrier is permitted thus to fill car orders "except where such carrier is unable to furnish the car or cars of the type or size ordered."

Moreover, the order provides for the virtual pooling of livestock cars at all stations or terminals when it stipulates: "That at any station or terminal served by more than one railroad, or by a terminal or switching line, all livestock cars shall be available without regard to the ownership as between carriers, so that where a livestock car of a specified type or size is ordered from one carrier and such carrier is unable to furnish a car of the type or size ordered, a greater number of cars may not be furnished by such carriers in lieu of the car or cars ordered, if a car or cars of the type or size ordered are available on the tracks or in the storage yards of any other carrier at such station or terminal."

With the issuance of the order, the commission also issued an amendment to Service Order No. 68, making the latter no longer applicable to the livestock shipments. As noted in the *Railway Age* of February 7, page 350, Service Order 68 suspended those provisions of Rules 24 and 34 of Consolidated Freight Classification No. 14 and other tariffs containing similar provisions with respect to the furnishing, substitution and use of multiple cars for single shipments.

New Black-Out Measures on British Roads

Known as "controlled beam" lighting, and conforming in all respects to the air raid protection regulations, a new system of station name sign illumination during the blackout is under experiment by the London & Northeastern (Great Britain), according to the Associated British & Irish Railways. At several suburban stations small black nameboards bearing the station name in 2½-in. or 3-in. white letters have been fixed in convenient positions on station walls; above and in front of each nameboard, at the end of a bracket secured at right angles to the wall, is a slotted metal box containing an electric lamp, the former being so designed that the width

of the light beam emitted does not exceed 3½ in., the length of the beam being no greater than the length of the lettering which in no case exceeds 22 in.

The light beam therefore only illuminates the letters forming the station name; hence the name "controlled beam" lighting. Since the brightness of the illuminated lettering is within the limits allowed for A. R. P. shelter signs, the name boards can be in use even during air raids. It is expected that if the results of the tests are successful, some 200 L. N. E. R. stations in England and Scotland will be similarly equipped as soon as the present limited supplies of material and labor will allow.

The use of ultra-violet rays and a special type of fluorescent chalk is speeding up the handling of freight cars in yards on the London, Midland & Scottish. The principal difficulty in yard operations during blackouts has been the inability of checkers to read the chalk numbers placed on the cars indicating the track to which they are destined.

Experiments conducted by the L. M. S. have resulted in this particular difficulty being overcome. Recently an important L. M. S. classification yard was equipped with ultra-violet ray lighting, the beam of which is directed down the hump over which the cars are shunted, the latter being marked with a special type of fluorescent chalk. The action of the ultra-violet ray on this special chalk activates its fluorescent properties and results in the numbers glowing while the car is in the ray.

Carrier Fined for Elkins Act Violation

The Highpoint, Thomasville & Denton on March 5 in the United States district court for the middle district of North Carolina at Rockingham, N. C., pleaded guilty to an information in four counts, three of which charged the granting of concessions in violation of section 1 of the Elkins Act, and one of which charged falsification of the carrier's records in violation of section 20 (7) (b) of the Interstate Commerce Act, according to information reaching the Interstate Commerce Commission. The court imposed a fine of $1,000 on each count charging concessions and $500 on the count of falsification, or a total of $3,500.

At the same time and in the same court the Thomasville Chair Company pleaded guilty to an information on three counts charging the soliciting and receiving of concessions in violation of section 1 of the Elkins Act. The court imposed a fine of $1,000 on each count or a total of $3,000.

The commission statement declared that the cases resulted from a misapplication of the provisions of Rule 34 of the consolidated freight classification with respect to shipments of furniture from Thomasville, N. C., to San Francisco, Calif. "On two-car shipments," the statement explained, "the carrier assessed and collected charges on the basis of the carload minimum weight of one car plus the actual weight of the shipment transported in the other car. Rule 34 had no application to these shipments since, in each instance, the shipper had ordered, received, and used two cars and was, therefore, obligated to pay the tariff charges based on the minimum weight of each car."

"Notations were placed on the bills of lading to the effect that a 50-ft. car had been ordered by the shipper and that two 40-ft. cars had been furnished by the carrier in filling the order. Since two cars actually had been ordered by the shipper, when these notations were transcribed to the carrier's freight waybills, its records were thereby falsified."

The cases were investigated by the commission's Bureau of Inquiry, which also assisted in the prosecution in the fedaral court.

S. P. Would Abandon Historic Line

That part of the original Central Pacific line which figured in the driving of the Golden Spike at Promontory Point, Utah, on May 10, 1869, linking up that line with the Union Pacific to form the first railway line to the Pacific Coast is due to be abandoned and dismantled in the near future if the Interstate Commerce Commission acts favorably on an application filed with it this week by the Southern Pacific.

The application specifically seeks authority to abandon the operation by the Southern Pacific between Lucin, Utah, and Ogden, via Corinne Junction, 146.9 miles. At the same time the Central Pacific, which is now a part of the Southern Pacific System, seeks authority to abandon that portion of its Promontory branch between Lucin, Utah, and Corinne, 120.8 miles.

The application points out that the Southern Pacific operates over the Central Pacific Promontory branch from Lucin, Utah, to Corinne Junction, where its route then joins the line of the Oregon Short Line (now a part of the Union Pacific) and continues into Ogden. The distance over the Union Pacific is 26.1 miles.

The original line of the Central Pacific, which was linked up with the Union Pacific at Promontory Point, Utah, in 1869, skirted around the northern end of the Great Salt Lake and is the line which is now sought to be abandoned. Later, the Southern Pacific built its so-called Lucin cut-off which goes directly across Great Salt Lake into Ogden. This is a double-track line built on a continuous bridge across the lake, while the Promontory branch is single track and has recently been used only occasionally.

Previously, the Southern Pacific sought to abandon that part of the branch extending from Lucin, Utah, to Kelton, some 55 miles. The protestants prevailed upon the War Department to intervene on the ground that the line was needed in view of the fact that in the event of a war with a Pacific power the line over the Great Salt Lake might be cut by bombing.

Acting on this contention of the War Department, Division 4 of the commission on June 11, 1934, denied the Southern Pacific authority to abandon the operation of a part of the branch. After the case had been appealed to the full commission, it was again denied on March 17, 1936, by a vote of six to four.

Due to the shortage of scrap iron, the view is now held in commission circles that the present application will not be opposed by the War Department since it is felt that that agency would rather have the scrap iron than the extra line.

WPB Refuses Steel Priority for Pipe Line

The War Production Board has again turned down Petroleum Coordinator Ickes on his proposal to build a 24-inch crude oil pipe line from the East Texas fields to the refining area adjacent to New York City. Recently Mr. Ickes renewed his plea for priorities for steel pipe for the line, in view of the oil situation on the east coast due to tanker sinkings as a result of enemy action. Previously, the project had been twice turned down by the WPB's predecessor, the Supply Priorities and Allocations Board.

WPB officials said that the third rejection was based on SPAB's findings that "the value of the pipe line as a defense project was not great enough to justify the high priority ratings that would be necessary."

Meanwhile, Mr. Ickes announced that tank car movement of oil into the eastern states was at the average rate of 323,775 barrels daily during the week ended February 28. This, it was pointed out, represents a slight decline from the record-breaking movement of 326,638 barrels daily during the preceding week. The drop may be explained, according to Mr. Ickes, by the fact that many of the more than 2,000 additional cars which were entered in the west-east service the previous week had not yet had time to be returned to supply points for reloading. Many of these cars are bringing oil as far from the east coast as Texas and transporting it as far as the New England area. The turnaround time for such a movement, it was noted, averages 18 or 19 days.

In moving 323,775 barrels each day into the east, the 14 participating oil companies loaded 10,073 cars. On the basis of an average of 225 barrels per car, this is equivalent to 2,266,425 barrels of petroleum and petroleum products. During the previous week, 10,162 cars were loaded, or the equivalent of 2,286,450 barrels.

Because of a shortage of transportation facilities, the reduction of crude oil production in District Three by 204,100 barrels daily under previously recommended rates has been called for by Mr. Ickes in telegrams to the regulatory bodies of the five southwestern states.

Mr. Ickes has also announced that tank car companies have begun to convert a number of ordinary railroad tank cars into cars capable of transporting essential liquefied petroleum gases used in making 100-octane gasoline and other war products. Details of this contemplated program of tank car conversion were given in the *Railway Age* of January 24, page 275.

WPB Reorganizes Industry-Branch Set-Up

A separate industry branch for transportation, formerly in the Transportation and Farm Equipment Branch, has been created by the War Production Board in a reorganization of the Bureau of Industry Branches of the Division of Industry Operations. Andrew Stevenson, formerly

chief of the Transportation and Farm Equipment Branch, has been named chief of the Transportation Branch.

The reorganization which increases the number of branches from 14 to 24, was effected by Philip D. Reed, chief of the Bureau of Industrial Branches. Also, Mr. Reed issued an order defining the powers and duties of branch chiefs. "The main task of the branch chief," these definitions said, "will be to bring about maximum use of existing industrial capacity within the industry assigned to him for the production of war material and products for essential civilian use. He will assist the industry assigned to him in every phase of its production program, including conversion, financing of new and expanded facilities, problems of labor supply, and procurement of materials and equipment."

Mr. Stevenson, who was graduated from the College of Wooster in 1926 with a B.A. degree, was in the service of short-line railroads in Illinois during 1925-26. Upon his graduation he went with the Atchison, Topeka & Santa Fe, where he remained until 1927, when he became a Strathcona Fellow in Transportation at Yale University. He was awarded his Ph.D. in 1930, the subject of his thesis being "Short Line Railroads." Meanwhile, Mr. Stevenson had become professor of transportation at Kalamazoo College in 1929, and he remained in that position until 1932, when he began a two-year period of service with the Associated Nevada and California Short Lines. In 1935, he was associated with the Federal Power Commission for a few months, and later in the same year he joined the staff of the Securities and Exchange Commission. While with S. E. C., Mr. Stevenson was loaned to the federal co-ordinator of transportation to assist in finishing the reports of that office. Also, during 1940 and 1941, he was loaned in turn to the National Defense Advisory Commission as consultant on transportation and utility matters, and to the National Resources Planning Board for a report on transportation and national defense. In September, 1941, Mr. Stevenson became acting chief of the Automotive, Transportation and Farm Equipment Branch of the Office of Production Management, WPB's predecessor; and he has been chief of the Transportation and Farm Equipment Branch of WPB since January.

British Railroads Develop Concrete Ties

Concrete ties are being tried out in substitution for the three million-odd timber ties which the British railroads require for replacement each year. Heretofore, the timber ties have been purchased from the Baltic and Scandinavian countries, Canada and Australia.

Experiments with concrete "sleepers" were made as long as 25 years ago, and have been continued at intervals without very satisfactory results. Now, with many sources of timber supplies closed by the war, and the need to save shipping space, concrete ties are being tried out again.

Generally, the use of concrete "sleepers" is being confined to sidings, yards and branch lines. One road, however, is shortly to make tests on a section of main line. Because full-length concrete ties have been found to develop defects under traffic, attention has recently been turned to pairs of concrete blocks, either "tied" together to keep the gage correct, or interspersed with wooden "sleepers." One railway is using 35,000 pairs of such blocks, and by the beginning of next year the output will be at the rate of 70,000 pairs a year. In some centers women are employed on making the blocks.

Money for Rivers and Harbors

Appropriations totaling $57,502,500 for rivers and harbors work are carried in the War Department Civil Functions Appropriation Bill for the fiscal year ending June 30, 1943. The bill (H. R. 6736) was reported from the House committee on appropriations on March 6, and passed by the House on March 11.

Included in the above total is $20,679,000 for new work, and $36,823,500 for the maintenance of existing projects. Appropriations for the current fiscal year ending June 30, 1942, totaled $70,968,640, including $27,868,600 for new work and $43,100,040 for maintenance. The bill does not appropriate for specific projects, but the committee report gave a list of improvements to which it is intended to apply the $20,679,000 appropriated for new work. Largest item on the list is $5,794,000 for the completion of work at Los Angeles, Calif., and Long Beach harbors. Other large projects listed are: New York and New Jersey channels, $3,600,000; New York harbor, $1,595,000; Sabine-Neches Waterway, Texas, $1,475,000; Missouri river, mouth to Kansas City, Mo., $1,400,000; Missouri river, Kansas City, Mo., to Sioux City, Iowa, $1,400,000; Mississippi river between Ohio and Missouri rivers, $1,300,000; Neah Bay, Wash., $1,375,000; Southwest Pass and South Pass, Mississippi river, La., $1,020,000.

"The chief of engineers," said the report, "stated to the committee that the President has said on numerous occasions that no public works projects, including those for the improvement of rivers and harbors and flood control, should be initiated unless they are definitely important to the national defense program, and, speaking for himself, said that the rivers and harbors and flood-control estimates for 1943 meet these criteria." Previously the committee had asserted that the bill "is practically devoid of functions which do not tie in with the war effort."

"Ninety-eight per cent of the total of the budget estimates," it went on, "applies to rivers and harbors, flood control, hydroelectric power, and the Panama Canal. Flood control, independently of power, is vitally important to national defense. A very grave set-back conceivably might ensue from the overflow of railroads and highways, the suspension of water transportation owing to flood conditions, the inundation of industrial plants engaged in the production of munitions, or in the inundation of approaches used by workers in industrial establishments. Devastating floods, interfering with national defense in such directions, could and very well might be as harmful as obstructions arising in other conceivable ways."

Construction

WESTERN PACIFIC.—This road is engaged in a yard expansion program involving the construction of new tracks and other facilities at its yards at Stockton, Cal., Oakland, Oroville, and Elko, Nev., and expects in the near future to begin an extensive program of extension work on passing tracks. At Stockton approximately 36,000 ft. of additional yard tracks are being constructed. Roadways, the yard office, and locomotive water and oil facilities will be relocated. Other small buildings and modern sanding facilities will also be constructed. The total cost of the work at Stockton will be approximately $155,000.

Oakland yard is being expanded with additional yard and storage tracks and other incidental features at a total cost of about $60,000. Approximately 26,000 ft. of additional yard tracks are being built at Oroville yard at a cost, including other incidental changes, of about $92,000.

PENNSYLVANIA.—This company is planning the construction of two major additions to its facilities, one in Harrisburg, Pa., proper, and the other at the east end of the Enola, Pa., yards, across the river, in order to keep pace with the constantly increasing volume of traffic being handled in and through the Harrisburg district. Both of the improvements include the laying of new tracks and re-arranging of existing ones. The effect will be to increase the efficiency of the yards in the handling of loaded and empty freight trains, by speeding up operations and expediting train movements generally.

At the east end of the Enola yard, about $500,000 will be expended to provide two additional "pull out" tracks. By re-arranging the present two tracks and switches at that point, and building two new tracks, as far as the Conodoguinet creek, the new four-track railroad will permit the building up of three eastbound trains at one time, and leave one track available for the entrance to the yard of westbound trains.

In order to further increase the speed and flexibility of freight train movements through the general Harrisburg territory, and relieve the Enola yards of much of the work of handling empty westbound trains, six tracks in the Harrisburg westbound receiving and classification yard will be extended so as to hold at least 125 cars each. These tracks will be electrified for their entire length, thus eliminating the need of changing from electric to steam power when entering the yard. The cost of this latter improvement is estimated at about $250,000. The work on these projects, which will be started at once, will be carried out by the Pennsylvania's own track forces under the general supervision of P. X. Geary, division engineer.

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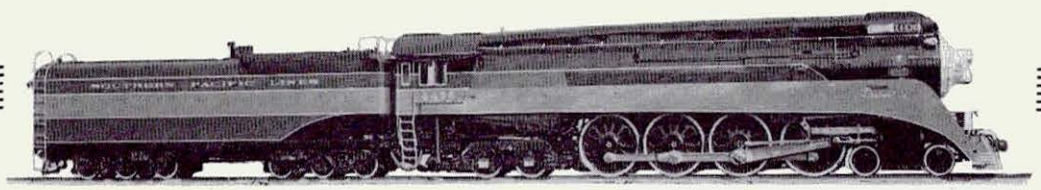
Modern train operation requires

...high horsepower at high speed



"THESE locomotives are used to handle the streamline "Daylight" trains between San Francisco and Los Angeles, which are frequently as heavy as 16 cars, weighing 924 tons loaded. On these trains, the portion of the run that requires the highest power output is eastbound from Camarillo to Santa Susanna, Calif., a distance of 20.9 miles, with an average opposing grade over the entire district of 0.75 per cent. Between these points the schedule speed is 62.7 mph. Examining the speed-record tapes, the writer finds that, on one 7-mile continuous stretch of compensated 1 per cent grade in this territory, the maximum speed maintained steadily is 55 mph. with the 16-car 924-ton train, which performance requires a calculated drawbar horsepower on the level of 4750; the equivalent cylinder horsepower is estimated at 5400. On other occasions, these locomotives have handled the "Daylight" with 13 cars, weighing 729 tons, on the 2.2 per cent Cuesta grade, making speeds of 28 mph. without a helper."

From an article appearing in the Jan., 1942, Transactions of the A.S.M.E., by Mr. F. E. Russell, Mech. Eng., Southern Pacific Company.

LIMA LOCOMOTIVE WORKS LIMA LOCOMOTIVE WORKS INCORPORATED INCORPORATED, LIMA, OHIO

Equipment and Supplies

Milwaukee Improvements Authorized

The Chicago, Milwaukee, St. Paul & Pacific has been authorized by the district court to spend $10,529,238 for improvements in 1942. Of the total, $6,846,000 is for repairs to roadbed and equipment, $1,130,291 is for new and second-hand rails, $1,270,457 is for the replacement or repair of bridges and $188,300 is for the construction of a spur to the government's ordnance plant at Badger, Wis.

LOCOMOTIVES

THE UNITED STATES WAR DEPARTMENT, Quartermaster Corps, is reported to be inquiring for from nine to twelve steam switching locomotives of the 0-6-0 type.

THE DENVER & RIO GRANDE WESTERN has ordered six 5400-hp. Diesel-electric freight locomotives from the Electro-Motive Corporation, subject to the approval of the district court.

THE DELAWARE & HUDSON has placed an order for 15 steam locomotives of the 4-8-4 type with the American Locomotive Company. Delivery is expected to begin in March, 1943. The inquiry for this equipment was reported in the *Railway Age* of November 1, 1941.

THE SOUTHERN PACIFIC is considering placing orders for a large number of steam locomotives. Included in these considerations are 30 of the road's cab-ahead engines of 4-8-8-2 type wheel arrangement, among the heaviest and most powerful in the world, and ten streamlined units of 4-8-4 type wheel arrangement. The cab-ahead locomotives are used in both freight and passenger service on the company's mountain divisions, and the streamlined units for service on fast passenger and merchandise trains.

The Southern Pacific placed one of the largest orders for steam locomotive power in many years in March, 1941, when it expended $11,000,000 for 50 large units, including 40 cab-ahead engines ordered from the Baldwin Locomotive Works, and 10 streamlined units of the daylight type ordered from the Lima Locomotive Works. The road was first reported considering the purchase of additional steam power in June, 1941, (*Railway Age*, June 21).

FREIGHT CARS

Pacific Fruit Express to Spend $21,000,000

The Pacific Fruit Express will spend more than $21,000,000 for the purchase of new cars and the rebuilding and heavy repairs to existing equipment in 1942. The new cars, orders for which will be placed shortly, include 2,000 refrigerator cars. The rebuilding program involves 2,500 refrigerator cars which will be equipped with new bodies in company shops in 1942 and 1943. During the same period, 3,000 refrigerator cars will be given heavy repairs.

THE BALDWIN LOCOMOTIVE WORKS is inquiring for 15 drop-end gondola cars of 50 tons' capacity.

THE UNITED STATES WAR DEPARTMENT has ordered 16 storage-box cars from the Pressed Steel Car Company.

An inquiry is in the market for the SAO PAULO RAILWAY OF BRAZIL covering 200 36-ft. 9-in. gondola cars of 42 metric tons' capacity.

THE GRAND TRUNK WESTERN has placed an order for 200 auto-box cars of 40 tons' capacity with the Pressed Steel Car Company. The inquiry for this equipment was reported in the *Railway Age* of January 17.

THE UNION PACIFIC has placed an order with the Rodger Ballast Car Company for 1,000 50-ton Hart selective ballast cars which will be built by the American Car & Foundry Co. Inquiry for this equipment was reported in the *Railway Age* of February 21.

THE CENTRAL OF GEORGIA has ordered 50 hopper cars of 50 tons' capacity from the Pullman-Standard Car Manufacturing Company. This road ordered 100 50-ton box cars from the American Car & Foundry Co. in February (*Railway Age*, February 21), and is expected to place an additional order for 50 50-ton flat cars.

PASSENGER CARS

THE WAR DEPARTMENT has ordered 16 kitchen cars from the St. Louis Car Company.

A-2 Priority for Truck Parts

The priority rating available for deliveries of materials for replacement parts of medium and heavy trucks, trailers, and buses, has been raised from A-3 to A-2 by the War Production Board. The better rating, the announcement said, was assigned "because it is necessary to the war program to keep existing trucks and buses running." The change was embodied in amendments to Limitation Order L-35 and to Preference Rating Order P-107.

Preference Rating for Trailers and Buses Extended

The War Production Board announced on March 7 that it had extended from February 28 until April 30 the A-3 preference rating available for deliveries of materials going into the manufacture of trailers and buses. The rating applies also to materials used in the manufacture of medium and heavy truck bodies, but not to materials for the manufacture of complete trucks or truck chassis.

After April 30, the WPB announcement said, the manufacturers of the trailers and buses will be unable to get material ratings unless they make application through the Production Requirements Plan under which materials are allocated quarterly by quotas.

Auto Industry May Sell Steel Inventories

Sheet and stripped steel, hot and cold rolled bars and other types of steel may be sold by the automotive industry to persons possessing high preference ratings, the War Production Board has ruled.

Since passenger car production was halted February 1, manufacturers have been left with considerable inventories of various steel products, the WPB announcement said. Under the ruling, the automobile companies may sell alloy steel, including stainless, to persons possessing an A-1-k or higher preference rating, and all other steel to persons having an A-3 or higher rating. Sales also may be made to the Defense Supplies Corporation, the Metals Reserve Company, or any other corporation organized under the Reconstruction Finance Corporation, or by specific consent of the director of industry operations of WPB.

Truck Rationing Plan Effective

Under the rationing program which became effective on March 9, civilian applicants for authority to purchase new trucks, tractors or trailers are required to apply by mail to a local allocation office of the Office of Defense Transportation on Form PD-310. Thereafter, as noted in the *Railway Age* of March 7, page 502, the application will proceed through the joint ODT-War Production Board rationing plan, with WPB having the final say, i. e., it issues or denies the "certificate of transfer" which must be presented to the sales agency from whom the applicant desires to purchase the vehicle.

A WPB statement issued on the day the rationing plan became effective, said that civilian applicants seeking to purchase vehicles "must show clearly" on Form PD-310 that: "(1) They cannot meet their needs by leasing equipment; (2) they cannot fill their needs by pooling their present equipment with that of other operators; (3) they cannot transfer vehicles now being used for less essential purposes to the use for which they desire new vehicles; (4) they cannot possibly repair the vehicles which they desire to replace."

January Locomotive Shipments

January shipments of railroad locomotives totaled 89 as compared with 96 in December and 64 in January, 1941, according to reports by builders to the Department of Commerce's Bureau of the Census. The January total included 19 steam locomotives, 57 Diesel-electrics and 13 of other types.

Unfilled orders at the end of January totaled 1,199 locomotives, including 522 steam, 584 Diesel-electrics, 56 electrics, and 37 of other types. As of January 31, 1941, the unfilled orders totaled 460 locomotives, including 157 steam, 238 Diesel-electrics, 17 electrics, and 48 of other types.

Data supplied by the Car Service Division, Association of American Railroads, on locomotive building in railroad shops

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THE PROGRESS REPORT OF THE RAILROAD DIVISION OF THE A.S.M.E. FOR 1940-41 STATES:

". . . one-seventh less steam per indicated horsepower"

"The disclosure of the results of laboratory and road tests of this locomotive*, equipped with the Franklin (oscillating-cam poppet-valve) system of steam distribution, is an outstanding event of the current year. In road tests, the locomotive, which has two 27-in. x 28-in. cylinders, 205 psi working pressure, and 80-in. drivers, developed a maximum horsepower of 2980 at 60-65 mph. Compared with the results of the A.A.R. passenger-train tests, previously reported in this series of papers, the gain in drawbar horsepower was 24 per cent at 60 mph, 33 per cent at 70 mph, and 44 per cent at 80 mph. With a 1000-ton train on level track, the poppet-valve engine attained 88 mph, and the original engine 78.5 mph. In general, the road tests showed the capability of the poppet-valve locomotive to meet the fastest schedules on the fast Fort Wayne-Chicago Division with trains of 13 cars. On the test plant, the locomotive developed a maximum indicated horsepower of 4267 at 75 mph and 4100 at 100 mph. With a steam consumption of 70,000 lb, the engine used about one seventh less steam per indicated horsepower at moderate speeds, and the improvement in economy increased to more than 30 per cent at 100 mph."

*The well-known K-4 Class of the Pennsylvania Railroad.

THE FRANKLIN SYSTEM OF Steam Distribution

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO

***In Canada:* FRANKLIN RAILWAY SUPPLY COMPANY, LIMITED, MONTREAL**

show that five locomotives (two steam and three electrics) were thus produced in January, as compared with one locomotive (an electric) in January, 1941. As of February 1, there were on order in railroad shops 35 locomotives, including 20 steam and 15 electrics.

Steel Plate Allocation Order

Order M-21-c which formalizes the allocation system on steel plates has been issued by J. S. Knowlson, director of industry operations, War Production Board.

The allocation system, announced on February 17, was outlined in the *Railway Age* of February 21, page 426. Under it plate allocations have been carried out under General Allocations Order No. 1, which now is changed to M-21-c to conform to the general system of numbering. The order changes the definition of plates to include stainless steel but otherwise follows the plate allocation and reporting system now in force.

Copper for Railroad Maintenance

The use of copper for "essential operating parts and essential maintenance and repair parts" for railway locomotives, cars and equipment will be permitted under an amendment to Order M-9-c issued March 2 by the Director of Industry Operations. The amendment adds railroad uses to List "B" of the Order, which permits the use of copper where the use of less scarce material is impractical.

An official interpretation shortly will be issued by the Copper Branch, War Production Board, to guide railroads in the uses for which copper will be permitted.

Supply Trade

Lewis C. Sorrell, consultant of the **Railway Business Association,** Chicago, resigned on March 1.

The acoustic division of the **Burgess Battery Company** has announced a change of address to 2815 West Roscoe street, Chicago.

R. B. Tucker, director of glass sales of the **Pittsburgh Plate Glass Company,** has been elected to the board of directors, succeeding **H. A. Galt,** who is retiring after more than 40 years of continuous service.

Leo F. Duffy, assistant vice-president of the **Camel Sales Company,** Chicago, has been promoted to vice-president; **Leo C. Voss,** assistant treasurer, has been promoted to assistant vice-president; and **Earl C. Browne** has been appointed assistant vice-president.

The United States Steel Corporation has insured the properties of its various subsidiary companies, other than railroads and steamship companies, with the Factory Insurance Associations, a group of the largest fire insurance companies, for approximately one billion dollars. In addition to fire and windstorm coverage on plant properties, the insurance covers sabotage and damage done by persons of malicious intent.

T. P. Gorter, sales agent of the **Pullman-Standard Car Manufacturing Company,** with headquarters at Washington, and **J. W. Scallan,** manager of sales of the Western district, with headquarters at Chicago, have been promoted to assistant vice-presidents with the same headquarters.

J. L. Mahon has been appointed district manager and **Robert Clade** works manager of the valve division of the **American Car & Foundry Co.** in Detroit, Mich. Mr. Mahon was formerly superintendent of foundries for this company in that city. **P. H. Sullivan,** formerly assistant district manager in Detroit, has been retired at his own request.

A. Donnally Armitage, formerly vice-president, has been elected president of **J. H. Williams & Co.,** to succeed J. Harvey Williams, whose death on February 23 was reported in the *Railway Age* of February 28. **E. J. Wilcox,** formerly sales manager of the stock products division, has been elected vice-president in charge of stock products sales; **Willard C. Kress,** formerly works manager, has been elected vice-president in charge of all manufacturing; and **Hugh Aikman** and **Clark M. Fleming** re-elected to the positions of secretary and treasurer, respectively. Mr. Fleming will fill the vacancy in the company's board of directors caused by Mr. Williams' death.

C. M. Mason, district sales manager in Buffalo, N. Y., for the **Jones & Laughlin Steel Corporation,** has been appointed district sales manager in Cleveland, Ohio, succeeding **E. A. France,** who retired after 37 years of service with the company. **E. H. Hughes,** formerly district sales manager at St. Louis, Mo., will succeed Mr. Mason at Buffalo. **L. S. Berkey,** formerly resident manager of sales in Toledo, Ohio, has been appointed district manager in St. Louis, and **E. S. Lewis,** of the company's general sales office in Pittsburgh, Pa., has been appointed resident manager in Toledo. **P. B. Turner,** special representative in the company's New York office, has been appointed manager of export sales, with **W. R. Spindler,** assistant manager.

Ronald R. Monroe has been elected a vice-president of the **J. G. Brill Company.** Mr. Monroe, who until recently was executive vice-president of the Utilities Power & Light Corporation of Chicago, will immediately assume charge of the company's manufacturing and purchasing activities. He will be located in Philadelphia, Pa.

Mr. Monroe graduated from the University of Michigan in 1915. His early business experience was gained in the middle west, where he served as president of the Des Moines Foundry & Machine Co. for several years, as well as director of two other manufacturing concerns. He became executive vice-president of the Utilities Power & Light Corporation in 1935 and, during the reorganization of that company, served as executive assistant to the trustee. For the past several years he also

Ronald R. Monroe

has served on the industrial advisory committee of the Federal Reserve Bank of Chicago, and holds directorships in the Missouri Utilities Company and the Black Hills Power & Light Co.

Ralph B. Rogers, president of the **Edwards Company,** manufacturers of self-propelled railway passenger motor cars, will head, as president, the new management of the **Hill Diesel Engine Company,** which has been purchased by the Edwards Company. **R. E. Olds** will remain as chairman of the board of directors. Due to the demands for increased production created by the war, an extensive program of modernization and enlargement of

Ralph B. Rogers

manufacturing facilities of the Hill Company has been started.

OBITUARY

A. Christianson, assistant to the president of the O. C. Duryea Corporation, New York, died in a sanitarium at Battle Creek, Mich., on March 5. Formerly, he was chief engineer of the Standard Steel Car Company and from July 1, 1933, until April, 1941, when he joined the Duryea Corporation, was chief engineer of the Pullman - Standard Car Manufacturing Company.

Continued on next left-hand page

Security Brick Arches

are designed

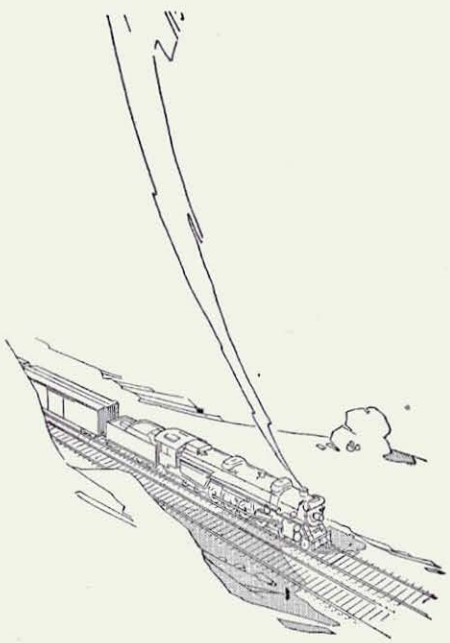
TO SAVE FUEL

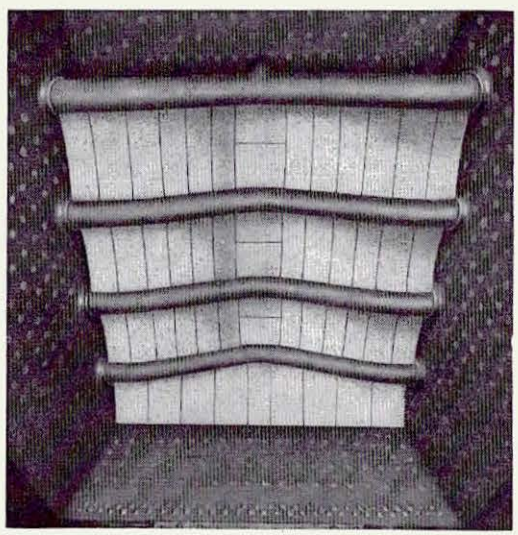
To show its full effectiveness as a fuel saver the firebox brick arch must be designed for the class of power in which it is to work.

Firebox designs are different and for full effectiveness the brick arch must be designed accordingly.

The Security Sectional Brick Arch is the result of many years of engineering and experience in locomotive operation, in studies of combustion and in the making of refractory brick.

Arch Company engineers over a period of many years have gained and applied a knowledge and experience nowhere else available. This knowledge and experience means many thousands of dollars each year in reduced fuel costs to the railroads of this country.

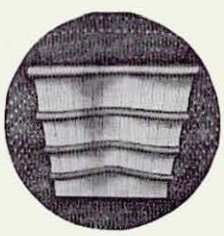




There's More to SECURITY ARCHES *Than Just Brick*

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists



AMERICAN ARCH CO.
INCORPORATED
60 EAST 42nd STREET, NEW YORK, N. Y.

Locomotive Combustion Specialists

Financial

ATLANTIC COAST LINE-LOUISVILLE & NASHVILLE.—*Abandonment by the Lexington Terminal.*—The Lexington Terminal has asked the Interstate Commerce Commission for authority to abandon its line extending from Crawford, Ga., to Lexington, 2.9 miles, and the Atlantic Coast Line and the Louisville & Nashville have requested permission to abandon the operation of the line.

BANGOR & AROOSTOOK.—*Bonds.* This company has asked the Interstate Commerce Commission for authority to nominally issue $8,000,000 of its consolidated refunding mortgage four per cent bonds, which bonds, after certification, are not to be sold, pledged, repledged, or disposed of in whole or in part without I.C.C. authority. The bonds will be part of $20,000,000 authorized to be issued under the consolidated refunding mortgage. All bonds of this issue bear the date of July 1, 1901, and will mature July 1, 1951.

The purpose of the issue, according to the petition to the commission, is to make available sufficient securities to enable the company to undertake negotiations looking toward the discharge and refunding of $5,240,000 of interest bearing securities consisting of:

1. $3,360,000 of Bangor & Aroostook first mortgage five per cent bonds dated January 1, 1893, and maturing January 1, 1943, being the entire amount authorized under the mortgage.
2. $1,250,000 of Bangor & Aroostook Piscataquis Division first mortgage five per cent bonds, dated April 1, 1899, and maturing January 1, 1943.
3. $500,000 of Bangor & Aroostook Van Buren extension first mortgage five per cent bonds, dated April 1, 1899, and maturing January 1, 1943.
4. $130,000 of Aroostook Northern first mortgage five per cent bonds, dated October 1, 1897, and maturing October 1, 1947.

CAROLINA WESTERN.—*Abandonment.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to abandon a portion of its main line extending from Russellville, S. C., to the end of the line at Halls, 1.5 miles.

CHICAGO & EASTERN ILLINOIS.—*Equipment Trust Certificates.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to assume liability for $1,200,000 of 2½ per cent equipment trust certificates, maturing in 30 equal semiannual installments of $40,000 on May 1 and November 1 in each year beginning November 1, 1942, and ending May 1, 1957. The issue has been sold at par and accrued dividends to the Reconstruction Finance Corporation.

CHICAGO & NORTHWESTERN.—*Equipment Trust Certificates.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to assume liability for $3,750,000 of 2½ per cent equipment trust certificates, maturing in 10 equal annual installments of $375,000 on March 15 in each of the years from 1943 to 1952, inclusive. The issue has been sold at 100.284 to the First Boston Corporation, acting on behalf of itself and Harriman Ripley & Co., Inc., F. S. Moseley & Co., and Kidder, Peabody & Co., making the average annual cost to the company approximately 2.46 per cent.

CHICAGO SOUTH SHORE & SOUTH BEND.—*Stock.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to issue 77,904 shares of common capital stock of a par value of $50 a share, to be exchanged for $43,043 shares of $5 first preferred stock and 19,476 shares of $6.50 second preferred stock, in order to effect a recapitalization.

"The recapitalization," commented Division 4, "is for the purpose of reducing the capital-stock liability of the applicant, simplifying its capital structure by eliminating all preferred stock, and to enable the applicant to distribute through dividends with maximum regularity a fair portion of its earnings among all stockholders."

DENVER & RIO GRANDE WESTERN.—*Abandonment.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to abandon a portion of its so-called Loma branch extending from Alamo Mine No. 2, Colo., to Alamo Mine No. 1, 0.9 mile.

MISSOURI PACIFIC.—*Abandonment.*—This company has requested authority from the Interstate Commerce Commission to abandon 952 ft. of track in Arkansas City, Ark., and a line extending from Bird's Point, Mo., to Alfalfa Center, two miles.

MISSOURI PACIFIC.—*Abandonment.*—This company has been authorized by Division 4 of the Interstate Commerce Commission to abandon the portion of its Pike County branch extending from Delight, Ark., to Krait Spur, 4.5 miles.

MISSOURI PACIFIC-ATCHISON, TOPEKA & SANTA FE.—*Construction and Operation.*—Division 4 of the Interstate Commerce Commission has authorized the Missouri Pacific to continue its operation from a point known as P. & M. Junction, Kans., over a track of the Pittsburg & Midway Coal Mining Company to a connection with a track owned by the Missouri-Kansas-Texas, 1.4 miles, and thence over tracks owned by the M. K. T. to a connection with the tracks of the mining company at Mineral, Kans., 3.5 miles. The Missouri Pacific, according to the report, had been operating over these lines since November 4, 1940, without commission authority. At the same time Division 4 denied the Northeast Oklahoma and the Atchison, Topeka & Santa Fe the right to gain access to the traffic of the coal mine by constructing some new line and acquiring trackage rights over a line of the Joplin-Pittsburg from Cherokee Junction, Kans., to Chicopee, two miles. Details of the case were set out in the *Railway Age* of October 4, 1941, page 557. Commissioner Porter wrote a short dissenting in part opinion in which he said he had no disagreement with the report so far as it grants to the Missouri Pacific trackage rights over the line of the Pittsburg & Midway Coal Mining Company and the M.K.T., but he dissented from the refusal to grant the Northeast Oklahoma trackage rights over the line of the Joplin-Pittsburgh and to construct a connection between the Northeast company and the Santa Fe.

NORTHWESTERN PACIFIC.—*Abandonment.*—This company has asked the Interstate Commerce Commission for authority to abandon two segments of its Manor branch extending from Larkspur, Calif., to San Anselmo, 3.1 miles, and from Fairfax, Calif., to Manor, 0.7 mile.

PENNSYLVANIA.—*New Director.*—J. R. Downes, vice-president—assistant to president of this road, was elected a director, succeeding C. D. Young, vice-president, who has entered military service.

SOUTHERN PACIFIC.—*Assumption of Liability by the Texas & New Orleans.*—The Texas & New Orleans has been authorized by Division 4 of the Interstate Commerce Commission to assume liability for $450,000 of Houston & Texas Central Railroad Company, Lampasas Extension first mortgage bonds, due July 1, 1933, and the following bonds of the Galveston, Harrisburg & San Antonio: $4,728,000 of Eastern Division first mortgage bonds, due August 1, 1935; $1,000,000 of Eastern Division second mortgage bonds, due June 1, 1935; and $10,000,000 of Galveston-Victoria Division first mortgage bonds, due June 1, 1940. Details of the transaction were set out in the *Railway Age* of February 21, page 431.

SOUTHERN PACIFIC.—*Equipment Trust Certificates.*—This company has asked the Interstate Commerce Commission for authority to assume liability for $5,660,000 of 2½ per cent equipment trust certificates, maturing in 10 equal annual installments of $566,000 on April 1 in each of the years from 1943 to 1952, inclusive. The proceeds will be used as part of the purchase price of new equipment costing a total of $7,111,401 and consisting of 1,900 steel-sheathed, wood-lined box cars and 300 steel flat cars with wood flooring.

The issue has been sold, subject to commission approval, at 100.009 to Salomon Brothers & Hutzler, acting for the joint account of itself, Dick & Merle-Smith, and Stroud & Co., Inc.

VIRGINIAN.—*Directors Elected.*—John W. Drye of the law firm of Larkin, Rathbone & Perry, New York, and C. W. Brown, Jr., assistant secretary of the Virginian at New York, have been elected directors of the road.

Average Prices of Stocks and Bonds

	Mar. 10	Last week	Last year
Average price of 20 representative railway stocks..	26.84	28.04	29.16
Average price of 20 representative railway bonds..	66.56	65.81	63.38

Dividends Declared

Elmira & Williamsport.—$1.14, semi-annually, payable May 1 to holders of record April 20.

New York, Lackawanna & Western.—$1.25, quarterly, payable April 1 to holders of record March 13.

Pittsburgh, Ft. Wayne & Chicago.—Common, $1.75, quarterly, payable April 1 to holders of record March 10; 7 Per Cent Preferred, $1.75, quarterly, payable April 7 to holders of record March 10.

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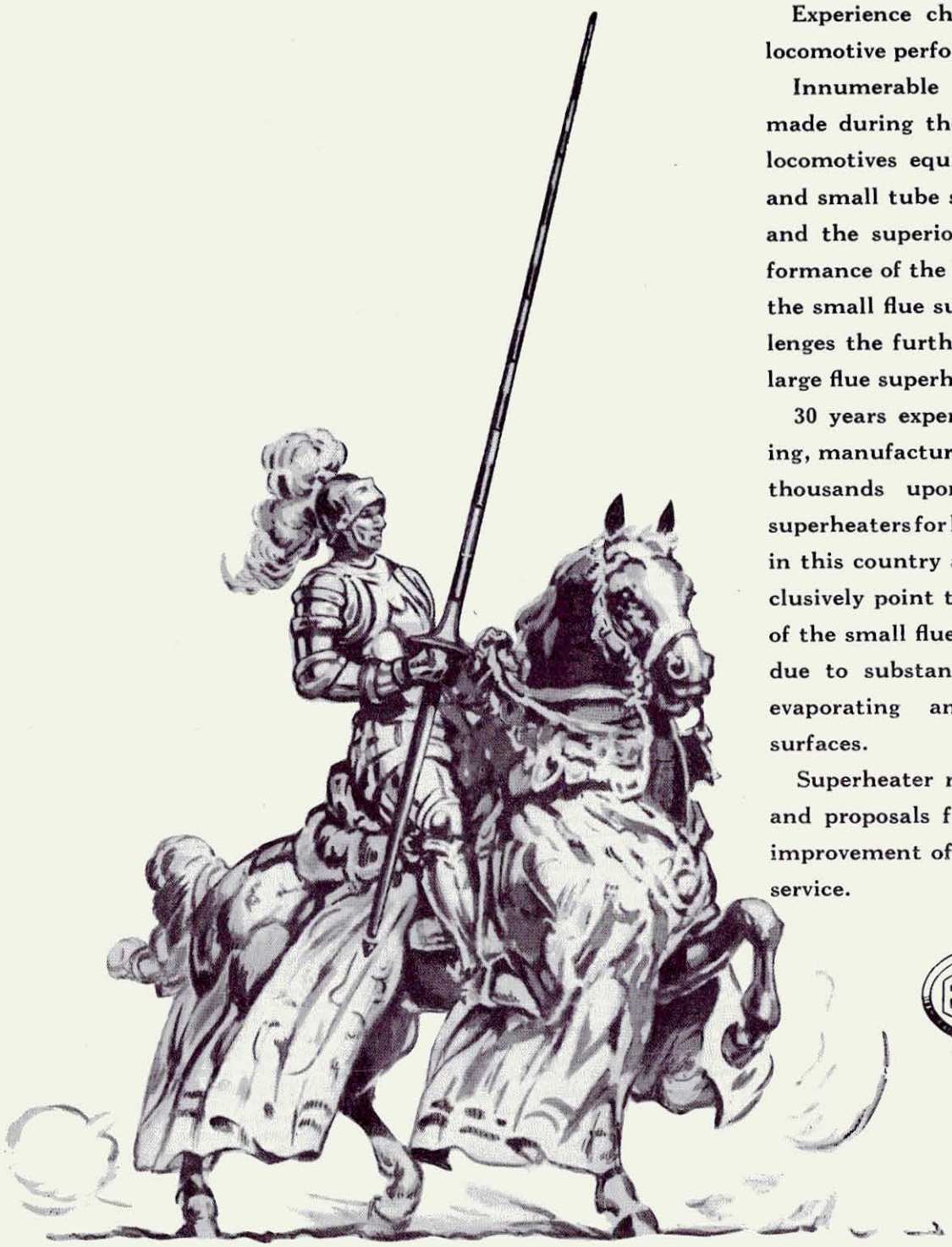
The Challenge of Experience



Experience challenges inferior locomotive performance.

Innumerable tests have been made during the last decade on locomotives equipped with large and small tube superheaters . . . and the superior operating performance of the locomotives with the small flue superheaters challenges the further application of large flue superheaters.

30 years experience in designing, manufacturing and servicing thousands upon thousands of superheaters for locomotives, both in this country and abroad, conclusively point to the superiority of the small flue superheater . . . due to substantial increases in evaporating and superheating surfaces.

Superheater recommendations and proposals for new power or improvement of old, is an Elesco service.

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Railway Officers

EXECUTIVES

J. G. Sheaffer, vice-president of the East St. Louis Junction Railroad, has been elected president, with headquarters as before at National Stock Yards, Ill., succeeding **G. R. Collett.**

August L. Sorenson, manager of stores of the Erie, with headquarters at Hornell, N. Y., has been appointed assistant to the vice-president, operations and maintenance department of the Association of American Railroads, with headquarters at Washington, D. C., as noted in the *Railway Age* of January 10. Mr. Sorenson was born at Copenhagen, Denmark, on May 23, 1885, and attended the New York University School of Commerce, Accounts and Finance. He entered railway service in August, 1900, with the Erie, serving as a junior clerk in the accounting department until March, 1905, when he went with

August L. Sorenson

the American Steel & Wire Co., as a warehouseman, later serving as office manager, creditman and assistant cashier. In September, 1908, Mr. Sorenson returned to the Erie as a special investigator for the comptroller, and subsequently served as statistician, chief clerk, special accountant, general auditor and comptroller. In 1921, he was appointed manager of stores. Mr. Sorenson also engaged in private practice as a public accountant and an instructor in accounting at New York University. He has been active in the Purchases and Stores division of the A. A. R. for many years and was chairman of that division from 1937 to 1939.

FINANCIAL, LEGAL AND ACCOUNTING

E. L. Merrill has been appointed general claims agent for the Grand Trunk Western, with headquarters at Detroit, Mich.

Russell M. Wilson, assistant general real estate agent of the New York, New Haven & Hartford, has been promoted to general real estate agent, with headquarters as before at New Haven, Conn., succeeding the late **Gilbert R. Kent.**

OPERATING

John S. Gorby, assistant editor of publications of the Railway Express agency, has been appointed assistant to general sales manager at New York.

W. H. Harris has been appointed trainmaster of the Rochester (N. Y.) division of the New York Central system. **W. R. Main** has been appointed assistant trainmaster of the Hudson and Mohawk division, at Albany, N. Y.

Robert Sommerville has been appointed general manager of hotels of the Canadian National, with headquarters at Ottawa, Ont., succeeding the late **Joseph Van Wyck,** whose death on March 2 was reported in the *Railway Age* of March 7.

P. F. Watzek has been appointed general manager of the Ashley, Drew & Northern and **W. B. Anderson,** assistant manager and auditor, has been appointed assistant general manager and auditor, with headquarters as before at Crossett, Ark.

A. N. Jewell, trainmaster on the Reading division of the Reading, has been appointed assistant superintendent of the Philadelphia division, succeeding **Charles J. O'Neill,** who has been appointed office manager, office of vice-president in charge of operation and maintenance.

G. H. Hill, assistant superintendent on the Chicago, Milwaukee, St. Paul & Pacific at Spokane, Wash., has been promoted to superintendent of the Coast division, with headquarters at Tacoma, Wash., succeeding **Walter C. Givens,** who has been granted a leave of absence because of ill health.

Richard O. Fischer, superintendent of transportation of the Illinois Central, with headquarters at Chicago, has been granted a leave of absence to enter military service, resulting in the following changes: **Wayne A. Johnston,** assistant to general manager, has been promoted to assistant general manager, with headquarters as before at Chicago, and **S. F. Lynch,** office manager, has been advanced to superintendent of transportation, relieving Mr. Fischer. **J. R. Anderson,** chief clerk, has been promoted to office manager, operating department, replacing Mr. Lynch.

S. G. Roney, trainmaster of the Macon division of the Central of Georgia, has been promoted to superintendent of that division, with headquarters at Macon, Ga., succeeding **M. B. Smith,** who has retired. **W. E. Dillard,** trainmaster in charge of the Chattanooga, Cedartown and Greenville districts of the Columbus division, has been promoted to superintendent of the Columbus division, with headquarters at Columbus, Ga., succeeding **Claude Baldwin,** retired. **C. P. LeSueur,** trainmaster of the Savannah division, has been transferred to the Macon division, succeeding Mr. Roney. **J. H. Harden,** dispatcher at Savannah, has been appointed trainmaster of the Savannah division, succeeding Mr. LeSueur. **E. D. Glenn,** general yardmaster at Columbus, succeeds Mr. Dillard as trainmaster.

Mr. Smith attended Auburn University and entered railroad service in 1891 as laborer with a bridge gang on the Central of Georgia at Hurtsboro, Ala., later serving as flagman and conductor. In February, 1900, he was promoted to general yardmaster at Columbus, Ga., and from February, 1907, to October, 1910, he was terminal trainmaster at Macon, Ga. From 1911 to 1912 he was trainmaster of the Macon division. From 1912 to 1915 Mr. Smith served as assistant superintendent of the Sorocabana railway in Brazil. On his return to America in 1915 he was appointed terminal trainmaster at Atlanta. From September, 1916, to June, 1917, he was terminal trainmaster at Savannah and on the latter date he was promoted to superintendent of the Columbus division, being transferred to the Macon division in December, 1918, which position he held until his retirement.

Mr. Baldwin entered railroad service as a brakeman with the Louisville Southern (now Southern) on March 18, 1892, subsequently serving as flagman and conductor. On September 19, 1894, he went with the Richmond & Danville as switchman, later serving that road as yard foreman, yardmaster, flagman and conductor. He entered the employ of the Central of Georgia in September, 1904, as yard foreman at Macon, later becoming general yardmaster at Atlanta, resigning on February 1, 1905, to go with the Southern as a conductor. A year later he returned to the Central of Georgia as general yardmaster at Savannah, and was later promoted to terminal trainmaster there. He became trainmaster of the Macon division on May 1, 1912, and was promoted to assistant superintendent of that division on April 7, 1913, in charge of the Macon yard. He was promoted to superintendent of the Macon Terminal on September 1, 1918, and on December 15, 1918, he was transferred to the Columbus division, which position he held until his retirement.

TRAFFIC

V. F. Green has been appointed division passenger agent of the Erie, with headquarters at Cleveland, Ohio, succeeding **Gerald Saunders.**

S. L. Lockwood, traveling freight and passenger agent for the Denver & Rio Grande Western at Kansas City, Mo., has been promoted to general agent at Omaha, Neb., succeeding **H. G. Bock,** whose death on February 9 was reported in the *Railway Age* of February 21.

William Denman Burch, whose promotion to executive general agent of the Kansas City Southern-Louisiana & Arkansas lines, with headquarters at New Orleans, La., was reported in the *Railway Age* of March 7, was born at Houghton, La., on April 8, 1899, and attended the University of Arkansas, Monticello, Ark. He entered railway service in 1916 as an

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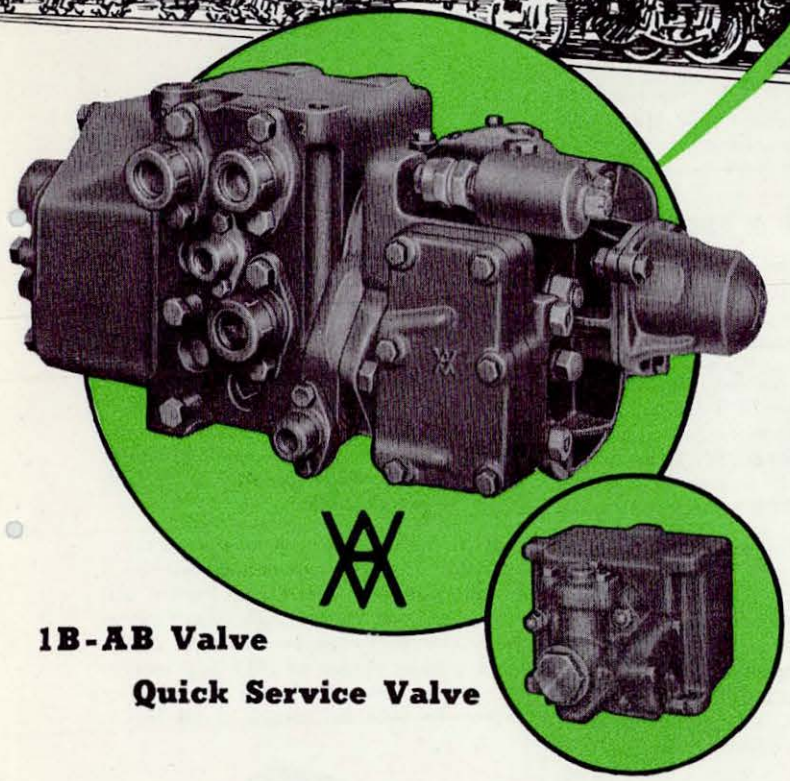
Here's the Solution to a Special Operating Problem!



1B-AB Valve

Quick Service Valve

The 1B-AB Valve is the same as the standard with the addition of a Filling Piece, which includes a safety valve with its cut off mechanism, a by pass device for the "controlled" emergency feature, and a signal pipe connection. With pressure in this pipe, the by pass device functions to permit continuous, passenger rate build up of emergency brake cylinder pressure. Otherwise, normal AB Valve operation prevails. Quick Service Valve is separate, installed in a brake pipe branch.

ON cars that are designed for freight service, but occasionally hauled in passenger trains, several provisions are required to adapt their brake performance to passenger train speeds so that proper control can be realized for this special operating condition.

These provisions are: Installation of the usual passenger car signal line and fittings ★ Increase of the braking ratio to passenger car standard ★ Brake cylinder pressure for full service applications limited by a safety valve, but permitted to attain possible maximum for emergencies ★ Continuous development of emergency brake cylinder pressure at passenger equipment rate ★ Use of a continuous quick service valve, to speed up full service application, if several of such cars are grouped together in a passenger train. ★ Such a combination of features is now incorporated in a modified equipment including the 1B-AB Valve.

If you have such a dual operating problem, here is the solution!

WESTINGHOUSE AIR BRAKE CO.

WILMERDING, PENNSYLVANIA

office boy in the traffic office of the L. & A. at Texarkana, Ark., and from 1918 to 1922 served as secretary to the traffic manager. Mr. Burch was promoted to traveling freight agent at Shreveport, La., in April, 1922, and in August, 1926, he was advanced to general agent at Oklahoma

William Denman Burch

City, Okla., later being transferred to Tulsa, Okla. In June, 1930, he was promoted to general freight agent, with headquarters at Shreveport, and in August, 1932, he was appointed general northwestern agent, with headquarters at Kansas City, Mo. Mr. Burch went with the Kansas City Southern in May, 1934, as commercial agent at Houston, Tex., and was later promoted to general agent at Shreveport. On September 1, 1939, when the K. C. S. and L. & A. were consolidated, he was appointed general agent for both lines at Washington, D. C., and on February 1, 1942, he was appointed assistant executive general agent at New Orleans, which position he held until his recent promotion, effective March 1.

C. E. Carlton, assistant freight traffic manager for the Missouri Pacific Lines at New York, retired from active service because of ill health on March 1. Mr.

C. E. Carlton

Carlton entered railway service in 1898 as a messenger boy for the Chicago, Burlington & Quincy at Galesburk, Ill., and then served successively in various capacities with the Atchison, Topeka & Santa Fe, the Texas & Pacific, the Houston Belt & Terminal, the Trinity & Brazos Valley (now the Burlington-Rock Island) and the Ft. Worth & Denver City, at various locations in Louisiana and Texas until 1906. In that year he entered the service of the Missouri Pacific Lines as a soliciting freight agent at Houston, Tex., where he was appointed commercial agent in 1912. In 1916, Mr. Carlton went with the Gulf Coast Lines (now part of the Missouri Pacific Lines) as general agent at Chicago, later serving in the same capacity at New York. After a year with the United States Shipping Board as district traffic representative at Houston, Mr. Carlton returned to the Gulf Coast Lines in April, 1919, as district freight and passenger agent at Houston and New Orleans, La., being sent to New York as general eastern agent in March, 1920. In 1925, he was made assistant freight traffic manager at Houston, returning to New York after a few months as general eastern agent. In 1927, Mr. Carlton was appointed assistant general freight agent of the Missouri Pacific Lines at St. Louis and in 1932 he was appointed perishable traffic manager. In May, 1935, he was promoted to assistant freight traffic manager at New York.

ENGINEERING & SIGNALING

William R. Judd has been appointed engineering geologist for the Denver & Rio Grande Western, a newly created position, with headquarters at Denver, Colo.

J. P. Dunnagan has been appointed engineer of bridges, Southern Pacific, Pacific lines, with headquarters at San Francisco, Cal., succeeding **George W. Rear,** whose death on February 10 was reported in the *Railway Age* of February 14.

H. G. Carter, division engineer of the Columbus division, of the Central of Georgia, has been promoted to the newly-created position of engineer of maintenance of way, with headquarters at Savannah, Ga. **W. E. Chapman,** supervisor of Americus and Greenville districts, at Columbus, Ga., has been appointed division engineer, succeeding Mr. Carter.

J. S. Webb, signal engineer of the Western Maryland, with headquarters at Hagerstown, Md., has been appointed assistant superintendent of signals of the Atlantic Coast Line, with headquarters at Wilmington, N. C. Mr. Webb was born at Baltimore, Md., and was graduated from the Baltimore Polytechnic Institute in 1912, in which year he entered the service of the Washington Terminal company at Washington, D. C. From 1913 to 1917 he was employed by the Baltimore & Ohio on signal construction and maintenance and in the office of the signal engineer. In 1917 he became affiliated with the Western Maryland, becoming signal engineer of that road in 1940.

MECHANICAL

John Gogerty, whose promotion to general superintendent of motive power and machinery of the Union Pacific, with headquarters at Omaha, Neb., was reported in the *Railway Age* of February 28, entered Union Pacific service in 1918 as a roundhouse foreman at Armstrong, Wash., and then served as general foreman and district foreman at various points on the western part of the Union Pacific system until

John Gogerty

1925, when he was promoted to master mechanic at Green River, Wyo. In 1928 he was transferred to Cheyenne, Wyo., and in 1933 he was advanced to superintendent of shops at Omaha. In 1936 Mr. Gogerty was promoted to acting assistant general superintendent of motive power and machinery, with headquarters at Cheyenne and in 1937 he was appointed assistant general superintendent of motive power and machinery, with the same headquarters. On April 1, 1940, he was advanced to superintendent of motive power and machinery, Eastern district, with headquarters at Omaha, which position he held until his recent promotion.

R. F. Weiss, whose promotion to superintendent of motive power and machinery, Eastern district, of the Union Pacific, with headquarters at Omaha, Neb., was reported in the *Railway Age* of February 28, entered railway service in 1913 as a messenger on the Union Pacific at Green River, Wyo. In 1918 he became a machinist's

R. F. Weiss

apprentice at Cheyenne, Wyo., and a year later he became a machinist, later serving as enginehouse foreman and district foreman at North Platte, Neb. In 1936 he

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Simplifies Maintenance Problems

LINERS, Pistons and Packing Rings made from HUNT-SPILLER *Air Furnace* GUN IRON can take the severe punishment of frictional wear and high temperatures in Diesel service.

The wear-resisting qualities insure pressure tight performance, maximum efficiency, economical fuel consumption and savings in repair costs.

Applications in the Diesel engines of your switchers and road units, regardless of the design or make, will solve many of the problems which are giving you trouble in the operation and maintenance of this type of prime mover.

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was promoted to assistant master mechanic at Cheyenne and less than a year later he was advanced to master mechanic at Green River, later being transferred to Cheyenne. During the year 1939, he served successively as special representative at Omaha, shop superintendent at Cheyenne and master mechanic at Pocatello, Idaho. Early this year, Mr. Weiss was appointed to a temporary position as assistant to the vice-president, research and mechanical standards, which position he held until his recent appointment.

E. R. Buck, superintendent of motive power of the Wabash and the Ann Arbor, with headquarters at Decatur, Ill., has been promoted to general superintendent of motive power, a change of title.

L. R. Haase, district boiler inspector of the Baltimore & Ohio, with headquarters at Baltimore, Md., has been appointed master mechanic of the Baltimore & Ohio Chicago Terminal, with headquarters at Chicago.

OBITUARY

Tindall Arthur Felstead, assistant engineer and chief draftsman for the Western lines of the Canadian Pacific at Winnipeg, Man., died at that point on March 3.

F. C. Elliott, who retired in 1927 as president of the White Pass & Yukon Route, with headquarters at Chicago, died in that city at the age of 90 on March 3.

Armand Elkin Hendee, general freight agent of the Southern, with headquarters at Atlanta, Ga., died on March 1 in that city, after 32 years of service with this road.

James M. Sheean, general counsel of the Baltimore & Ohio Chicago Terminal, with headquarters at Chicago, died on March 3 in a hospital at Ford Lauderdale, Fla.

Walter L. Haehnlen, president of the Tonopah & Goldfield railroad and the Tonopah Mining Company, with headquarters at Philadelphia, Pa., died in that city on March 5.

John A. Burke, supervisor of air brakes of the Atchison, Topeka & Santa Fe system, with headquarters at Topeka, Kan., died suddenly at Ft. Wayne, Ind., on February 6. Mr. Burke was active in the Air Brake Association and was a member of the executive committee of that association in 1937. He was a vice-president of the Railway Fuel and Traveling Engineers' Association at the time of his death.

Frank A. Clifford, superintendent of stations and claim prevention of the Missouri Pacific, with headquarters at St. Louis, Mo., whose death on February 21 was reported in the *Railway Age* of March 7, was born in Alton, Ill., and entered the service of the Missouri Pacific in 1904 as a station accountant at Bixby, Ill., later becoming a traveling auditor. In 1911, he was placed in charge of station accounts in the general office at St. Louis and, in 1916, he was promoted to special assistant to the general manager. He was advanced to superintendent of station service in June, 1924, and in September, 1925, when the offices of superintendent of claim prevention and superintendent of station service were consolidated, he was appointed assistant superintendent of stations and claim prevention. Mr. Clifford was appointed special assistant to the general manager on May 16, 1929, and on March 1, 1939, he was promoted to superintendent of stations and claim prevention.

The U. S. War Department reports that **Col. John A. Gillies,** who has been on leave of absence from his post as general manager of the Atchison, Topeka & Santa Fe at Amarillo, Tex., has been missing from a plane trip overseas since late in February. As reported in the *Railway Age* of October 18, 1941, Mr. Gillies was called to service as a colonel in the Army Engineering Corps.

Prescott B. Beidelman, freight traffic manager in charge of business solicitation for the Great Northern, with headquarters at St. Paul, Minn., died on March 7 after an extended illness. Mr. Beidelman was born in Little Rock, Ark., and was engaged in U. S. Army construction work before railroad employment. He entered railway service on the Great Northern in 1900 as a secretary in the traffic vice-president's office and three years later he was appointed foreign freight clerk. In 1906 he was promoted to general agent of refrigerator service. Mr. Beidelman was advanced to assistant general freight agent at St. Paul in 1916 and to general freight

P. B. Beidelman

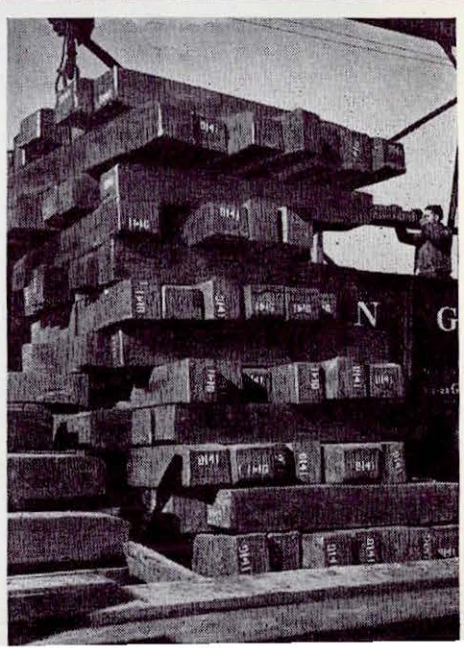
agent on July 1, 1928. On February 1, 1930, he was promoted to freight traffic manager in charge of business solicitation, which position he held until his death.

Phil G. Safford, who retired in 1940 as assistant to the president of the Mississippi Valley Barge Line, died suddenly in St. Louis, Mo., on February 26. Mr. Safford was born at St. Albans, Vt., on April 27, 1875, and at the age of 17 entered the service of the New York & New England (now part of the New York, New Haven & Hartford) as office boy in the general passenger department. After other service in the traffic departments of various railroads, he located in St. Louis with the Missouri-Kansas-Texas in 1894. Between 1900 and 1922 he saw traffic service with the Southern Pacific; the Chicago, Rock Island & Pacific; the Northern Pacific; the Oregon Short Line (part of the Union Pacific); the Gulf, Colorado & Santa Fe; the Chicago, Burlington & Quincy; the St. Louis-San Francisco and the Central Weighing and Inspection Bureau. In 1922 he went with the St. Louis Southwestern as assistant general freight agent in charge of I. C. C. matters and in 1929 he became associated with the Mississippi Valley Barge Line as assistant to the president, which position he held until his retirement in 1940.

William R. Culver, superintendent of stores of the Chesapeake & Ohio, the

William R. Culver

Nickel Plate and the Pere Marquette, with headquarters at Cleveland, Ohio, died suddenly while on a train en route from Grand Rapids, Mich., to Cleveland on March 6. Mr. Culver was born at Tucson, Ariz., on July 15, 1884, and entered railway service on July 1, 1902, with the Southern Pacific. On April 1, 1906, he was appointed assistant paymaster of the Southern Pacific of Mexico, holding this position until August 30, 1908, when he resigned to become division storekeeper of the National Railways of Mexico. On February 1, 1910, Mr. Culver rejoined the Southern Pacific of Mexico, being engaged on roadway accounting until March 31, 1911, when he was appointed chief of the material requisition bureau of the National Railways of Mexico. On April 15, 1913, he left this company to go with the Pere Marquette as division storekeeper, being appointed traveling storekeeper in April, 1915, and general storekeeper in October, 1916. On August 1, 1917, Mr. Culver left railway service to become manager of factory sales of the Willys-Overland Automobile Company. Later he served as assistant purchasing agent and supervisor of stocks with the Earle Motor Car Company. He re-entered railway service on August 1, 1923, as general storekeeper of the Pere Marquette. On November 1, 1931, he was made general storekeeper of the Chesapeake & Ohio, and on June 15, 1937, he was promoted to superintendent of stores of the C. & O., the Nickel Plate and the Pere Marquette, with headquarters at Cleveland.



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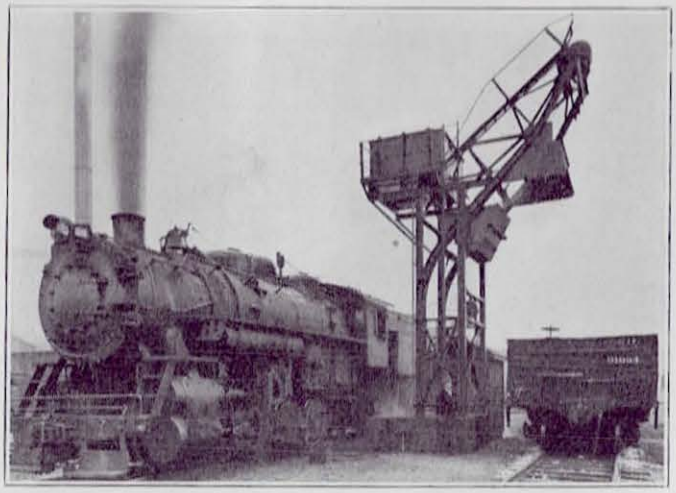
The vertical tower on which rests the electric winding drum is 16′ lower in height than the older type of cinder plant offered.



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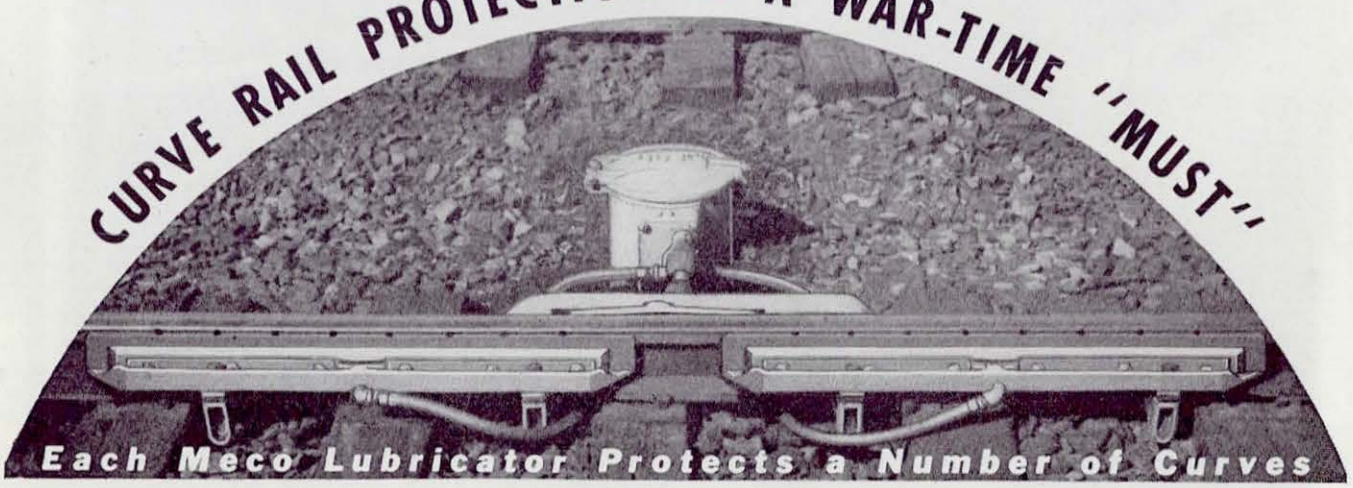

Every railroad man knows curves are the most hazardous parts of the track. Therefore, they receive preferred attention, including daily inspection. Today, railroads have a choice of two methods of maintaining curves, safely.

FIRST

To regauge and respike rails constantly, to keep renewing spike-killed ties, and to replace the rails in curves at frequent periods (if you can *get* new rails).

SECOND

To give curves adequate (Meco) lubrication, thus minimizing flange wear on rails . . . and *make curved rails last as long as tangent rails.*

MECO *Rail and Flange Lubricators*

1. Minimize curve rail wear otherwise caused by wheel flange friction; also reduce wheel flange wear, particularly on locomotive wheels.
2. Prolong curve-rail life, prevent frequent rail replacement jobs with their traffic interruptions.
3. Reduce derailment hazards by decreasing curve friction. Thus make possible higher train speeds, with safety.
4. Eliminate or reduce regauging and realigning of curves; also lessen respiking and continual replacement of spike-killed ties.
5. Frequently do away with helper service, or permit increased tonnage ratings through divisions where curvature governs such ratings.
6. Reduce fuel consumption.

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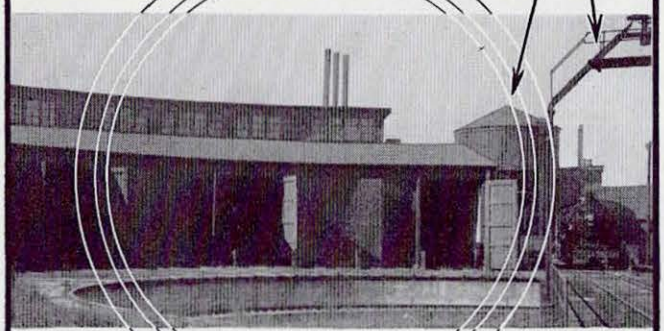

Now is a mighty good time to check-up those "out-of-sight out-of-mind" built-up and roll roofs. Like wheel bearings, they dry out and fail before giving full service unless you "lubricate" them regularly. By re-saturating and re-coating every 3 or 4 years with Mule-Hide Nu-Life Liquid Asphalt you extend their life indefinitely. Just brush it on—no heating—no fancy equipment—safe and inexpensive insurance.

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A few cents worth of Mule-Hide Stay-Tite Plastic Cement troweled into and around these danger spots will make your whole roof more safe and secure. Gives 4 to 5 years of waterproof protection.

FOR NEW BUILT-UP ROOFS

Check into Mule-Hide Cold Process. Millions of square feet giving satisfactory Railroad Service today.

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It pictures and describes every step in the application of a Mule-Hide Cold Process Built-Up Roof. Good information to have handy in your files.

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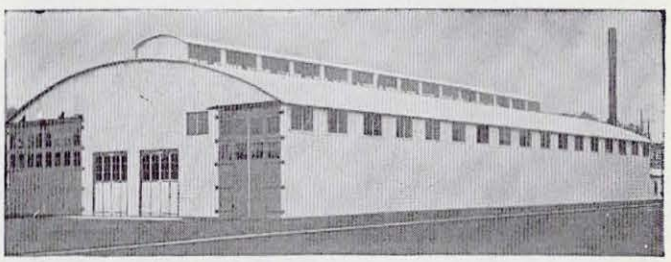
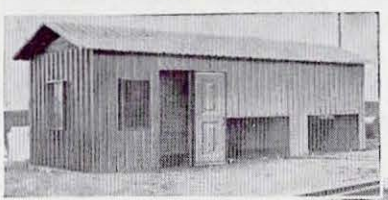


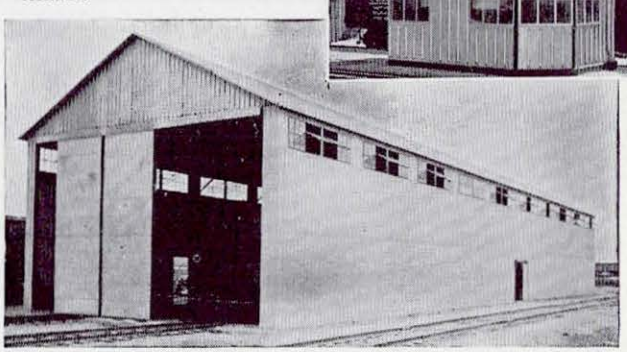


At top—Lined interior of steam heated 90′x200′x22′ Butler steel building (Above) housing fruit handling docks.

At left—Butler motor track car and tool house.

At right—Butler freight car scale house.

Below—Butler 40′x160′x22′ railway car repair shop which survived a tornado.



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There are three helpful Butler Steel Building Books. One shows more than a hundred Butler Buildings as used in a score of industries. Another, Butler Boulevard Buildings (steel inside and out). The third, Butler made USS Panelbilt Buildings.

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Other sales offices: Washington, New York, Chicago, Atlanta, Shreveport and Houston.

Also representatives in other principal cities.

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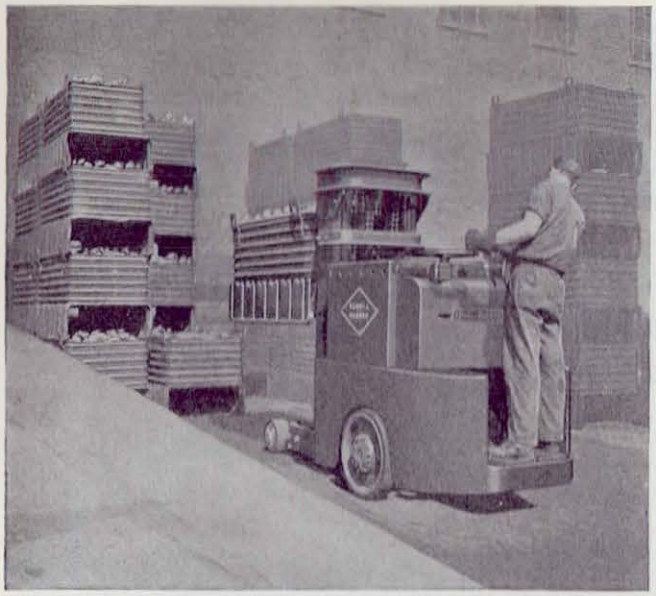

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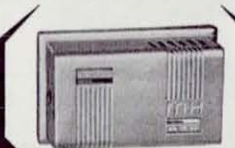

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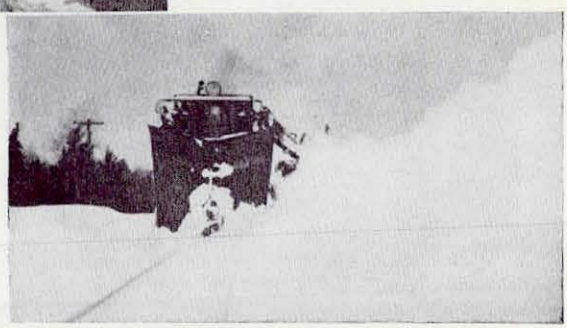

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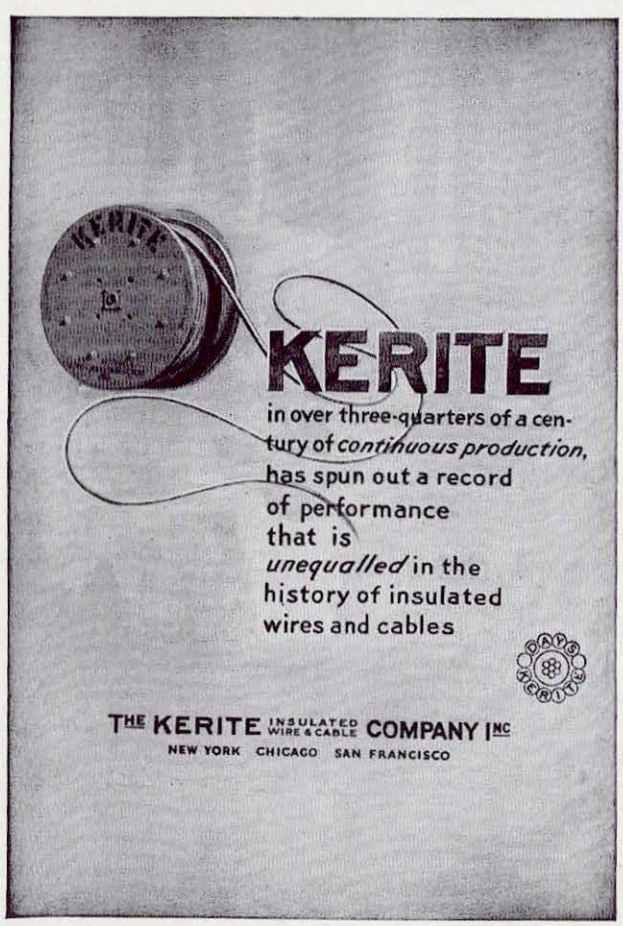
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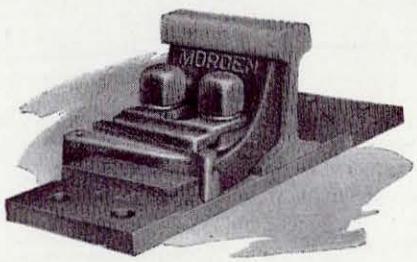

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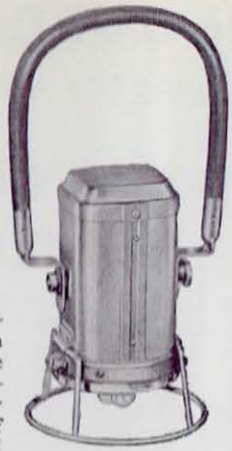

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Candle Power
Beam
plus light
to sides.

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Safety Cans (left) provide the safe way to store and handle gasoline and other 'flammable liquids. Oily Waste Cans (right) reduce danger of fire from oily waste and rags.

Write for catalogs of Justrite Safety Products.

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Also, present high market prices will reduce book losses quite appreciably!

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CITY OF CHICAGO
STATE STREET SUBWAY
INSTALLING SIGNAL AND INTERLOCKING EQUIPMENT
CONTRACT T-8

Sealed bids, endorsed "PROPOSAL FOR INSTALLING SIGNALS AND INTERLOCKING EQUIPMENT, CONTRACT T-8," will be received by the City of Chicago, in the County of Cook and State of Illinois, at the office of the Commissioner of Subways and Superhighways, Room 1940, 20 N. Wacker Drive, Chicago, Illinois, until 2 o'clock P. M., Central Standard Time (United States War Time), on Thursday, April 2nd, 1942, at which place and time all such proposals will be opened publicly and read aloud by a representative of the Commissioner of Subways and Superhighways.

The work for which such proposals are invited consists of installing an electro-pneumatically operated automatic block signal system complete with wayside signals, automatic train stops, interlocking equipment and controls, and other materials and equipment appurtenant and collateral thereto. The signal system is to be installed in and on the structures of the State Street Subway located in S. State Street, N. State Street, W. Division Street, N. Clybourn Avenue and in rights-of-way which have been or will be acquired by the City of Chicago, and on the elevated track structure of the Chicago Rapid Transit Company located adjacent to the two points of connection of said subway with said elevated track structure, as shown on the plans and described in more detail in Requirements for Bidding and Instructions to Bidders.

All bids must be made upon blank forms of proposal as furnished by the Commissioner of Subways and Superhighways and included in the Contract Documents, and shall be made in accordance with the provisions contained in said documents.

The Contract Documents, including Standard Specifications for Subway Construction, Contract Requirements and Contract Plans, are on file and available to bidders at the office of the Commissioner of Subways and Superhighways at Room 1940, 20 N. Wacker Drive, Chicago, Illinois. Copies of the Contract Documents may be obtained by depositing Twenty-five Dollars ($25.00) with the Commissioner of Subways and Superhighways, for each set of documents. The amount of the deposit for one set of documents will be refunded to each actual bidder who returns the said documents in good condition within ten (10) calendar days after the opening of bids. Fifteen Dollars ($15.00) will be refunded for each of all other sets of documents so returned.

Each proposal must be accompanied by cash or a certified check drawn on some responsible bank doing business in the city of Chicago, in the amount of Twenty Thousand Dollars ($20,000.00) payable to the order of the City of Chicago. Any proposal submitted without being accompanied by such cash or certified check may be considered informal and consequently may be rejected.

The City of Chicago reserves the right to reject any or all bids and to disregard any informalities in the bids and bidding.

No bid may be withdrawn, after the scheduled closing time for receipt of bids, for at least forty-five (45) calendar days.

CITY OF CHICAGO,
By PHILIP HARRINGTON,
Commissioner of Subways and Superhighways.
Chicago, Illinois, March 12, 1942

INDUSTRY ANSWERS THE CALL!

A WAR MESSAGE
to
ALL EMPLOYERS
★ From the United States Treasury Department ★
WHETHER THIS WAR is going to take the mightiest effort America has ever made—in men, materials, and money!
An important part of the billions of dollars required to produce the planes, tanks, ships, and guns our Army and Navy need must come from the sale of Defense Bonds. Only by regular pay-day by pay-day investment of the American people can this be done.
Facing these facts, your Government needs, urgently, your cooperation with your employees in immediately enrolling them in
A PAY-ROLL SAVINGS PLAN
The voluntary Pay-Roll Savings Plan (approved by organized labor) provides for regular purchases by your employees of Defense Bonds through voluntary pay-roll allotments. All you do is hold the total funds authorized from pay-roll allotments in a separate account and deliver a Defense Bond to the employee each time his allotments accumulate to an amount sufficient to purchase a Bond.
You are under no obligation, other than your own interest in the future of your country, to install the Plan after you and your employees have given it consideration.
WHAT THE PAY-ROLL SAVINGS PLAN DOES
1. It provides immediate cash now to produce the finest, deadliest fighting equipment an Army and Navy ever needed to win. 2. It gives every American wage earner the opportunity for financial participation in National Defense. 3. By stoving up wages, it will reduce the current demand for consumer goods while they are scarce, thus retarding inflation. 4. It reduces the percentage of Defense financing that must be placed with banks, thus putting our emergency financing on a sounder basis. 5. It builds a reserve buying power for the post-war purchase of civilian goods to keep our factories running after the war. 6. It helps your employees provide for their future.
To get full facts on installing the Pay-Roll Savings Plan, write TODAY to: Treasury Department, Section B, 709 12th Street, NW., Washington, D. C.
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Do *your* part by installing the Pay-Roll Savings Plan *now*. For truly, in this war, this *people's* war, VICTORY BEGINS AT THE PAY WINDOW.

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For full facts and samples of free literature, send the coupon below—today! Or write, Treasury Department, Section C, 709 Twelfth Street NW., Washington, D. C.

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We want to do our part. Please rush full information regarding the Pay-Roll Savings Plan.

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COMPANY NAME .....
ADDRESS .....
NUMBER OF EMPLOYEES .....

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MAKE EVERY PAY-DAY . . . BOND DAY!

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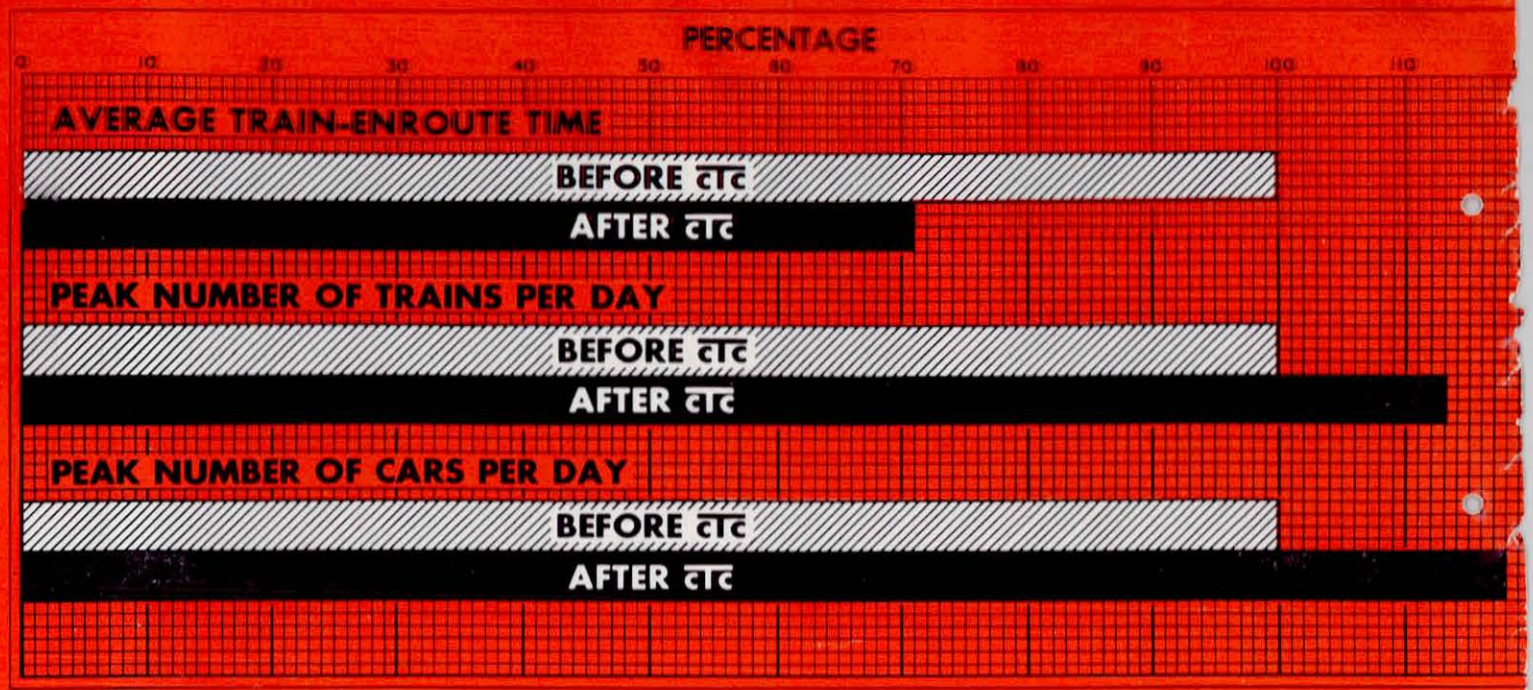

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This reduction in train-enroute time, achieved during these new high peak periods (and during severe winter weather), demonstrates how CTC makes possible appreciable increases in track capacity.

Have you a sub-division where increased track capacity would be desirable? If so, consult our nearest District Office.

G-R-S

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A-1567